



Final Report

Bat Count Philippines

CLP Project Identification Number: 001706F

Host country: Philippines

Site location: field work and training: Protected areas, nation-wide
central office: Dumaguete City, Negros OR

Dates of fieldwork: January 2006 – July 2011

Collaborating institutions:

International

Bat Conservation International (BCI)
IUCN, Species Survival Commission, Bat Specialist Group
Lubee Bat Conservancy
Southeast Asia Bat Coordinating Research Unit (SEABCRU)
United Nations, Food and Agriculture Organization, Emergency Prevention System (EMPRES) for Transboundary Animal and Plant Pests and Diseases
University of Montana (UM)
University of the Philippines-Los Baños (UPLB)
Wildlife Conservation Society of the Philippines (WCSP)

Philippines

Philippines Department of Environment and Natural Resources, Protected Area and Wildlife Bureau (DENR-PAWB)
Silliman University
University of the Philippines, Mindanao
University of the Philippines, Los Baños
Isabela State University
Mindanao State University
Leyte State University
Center for Tropical Conservation Studies
Philippine Endangered Species Conservation Project
Cebu Biodiversity Conservation Foundation
Soil and Water Conservation Foundation
Calinawan United Farmer's Association
Cienda San Vicente Farmers' Association
Katala Foundation
CROC Project
Ecology Center, Subic Bay Metropolitan Authority

Overall Aim: To promote flying fox conservation in the Philippines through baseline research and capacity building.

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Photo by: Apolinario B. Cariño

Bat Count Philippines

Working to promote the long term, sustainable conservation of globally threatened flying foxes in the Philippines, by developing baseline population information, increasing public awareness, and training students and protected area managers in field monitoring techniques.

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Acknowledgements

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Many local government units and non-profit organizations in the Philippines have donated their help and in-kind support in the field including: Friends of the Flying Foxes (FFF-Boracay), Mt. Talinis People's Organization Federation Inc. (MTPOFI), Pederasyon sa Nagkahiusang mga Mag-uuma nga Nanalipud ug Nagpasig-uli sa Kinaiyahan Inc. (PENAGMANNAKI), Negros Occidental Biodiversity Conservation Education Programme, Philippines Biodiversity Conservation Foundation, Inc, Negros Forests and Ecological Foundation, Inc. (NFEFI-BCC). SBMA Ecology Centre (especially Mrs. Lilia Alcazar and Ms. Ameth Dela Llana), the WIN Project and Ocean Adventure at Subic Bay.

Finally, we thank the many people committed to supporting fruit bat conservation, who have helped us along the way. Patricia Gallardo, Shangri-La, Boracay; Mimie Ledesma, Negros Occidental Biodiversity Conservation Education Programme, Philippines Biodiversity Conservation Foundation, Inc, Negros Forests and Ecological Foundation, Inc. (NFEFI-BCC); Julia Lervik, President (FFF); Sam Stier; Renee Mae Lorica, Friends of the Flying Foxes; Cyd Catan, Renee Lorica, Vincent Gunot, Rene Vendiola, Angelo Bibar, Mambukal Natural Park, and many, many others!

Section 1: **SUMMARY**

For over 10 years, our project has been promoting the conservation of large flying foxes in the Philippines through research, capacity building, and raising public awareness. Our survey methods have been adopted as the national standard, and we have a strong working relationship with the Philippine government and many local non-profit organizations. With this recent funding from the Conservation Leadership Programme, we have built on our project's national successes and also expanded our focus internationally.

In the Philippines, field surveys have played a lesser role in our project in the last few years, because we have surveyed most of the known fruit bat colonies. We have continued our outreach efforts through training and capacity building and raising local awareness to support Philippine fruit bat conservation.

We were fortunate during this project period to develop many opportunities to support international conservation efforts. Our project is now a role model for fruit bat conservation efforts in the Pacific Islands and across the Southeast Asia region. We are also honored to have been given a lead role on revising the IUCN's Action Plan for Old World fruit bats, which will steer fruit bat conservation research and management for the next couple of decades.

INTRODUCTION

Large flying-foxes in insular Southeast Asia are the most threatened of the Old World fruit bats due to large scale threats and little conservation commitment from local governments (Mildenstein 2002). Despite the fact they are globally endangered (Mickleburgh et al. 1992) and play essential ecological roles in forest regeneration as seed dispersers and pollinators (Marshall 1983; Cox et al. 1991) there have been few studies on these bats that provide information useful to their conservation management.

There are a number of challenges to the conservation of large fruit bats in Southeast Asia.

RESEARCH

1) Population size and distribution of most large fruit bat species is unknown. This makes it difficult to justify these species as conservation priorities (e.g. by IUCN Red List, national managers, funding agencies) and to track trends of species of concern (Mickleburgh et al. 1992).

2) How fruit bats respond to key threats is unknown. The main threats to fruit bats are habitat loss and hunting, which are widespread in Southeast Asia (Dinerstein and Wikramanayake 1993). However, it is unknown how large fruit bats are affected by each and what managers can do to minimize negative impacts.

TRAINING AND CAPACITY BUILDING

3) Managers lack training in field survey techniques. Without basic training in identification and monitoring techniques, protected area managers cannot take charge of fruit bat conservation in their areas of jurisdiction and evaluate their progress (e.g. Eby 1991).

4) Public awareness of and support for fruit bat conservation is minimal. Fruit bats play crucial roles in maintaining forests and thus vital ecosystem services on which human communities depend (e.g. clean water, clean air). However, most people know very little about fruit bats and the need for conservation (Mildenstein et al. 2002).

5) Hunters are not aware that their hunting activity is illegal and/or unsustainable at levels. Prohibition of fruit bat hunting is often impossible because of the widespread popularity of fruit bat hunting and SE Asian governments' minimal resources for on-the-ground protection of

wildlife. Hunters would likely self-regulate their hunting levels to maintain the sport of fruit bat hunting into the future, however, they need to understand bats are a limited resource and be encouraged to limit their hunting (Mildenstein et al. 2002).

COORDINATION/COLLABORATION ACROSS BORDERS

6) There is no fruit bat conservation coordination among SE Asia countries/Pacific Islands. Southeast Asia is one of the world's most biologically diverse regions, but it is also one of the most threatened areas (Whitmore 1997, ICBP 1992). Although the countries of Southeast Asia share many fruit bat species and battle the same main threats to fruit bats (deforestation and hunting), there is little coordination among fruit bat research and conservation across the region.

7) We need non-invasive techniques to study fruit bat population genetics. Many fruit bat species migrate across political borders in SE Asia and the Pacific Islands. Migration like many conservation questions can be best answered using genetics. However, sampling of fruit bat genetics have traditionally relied on tissue samples, which are difficult to acquire, must be taken by experts, and incur handling risks to the bats. Non-invasive methods for acquiring genetic samples would both be safer for the bats and likely make genetic techniques more accessible to local biologists (Mildenstein 2010).

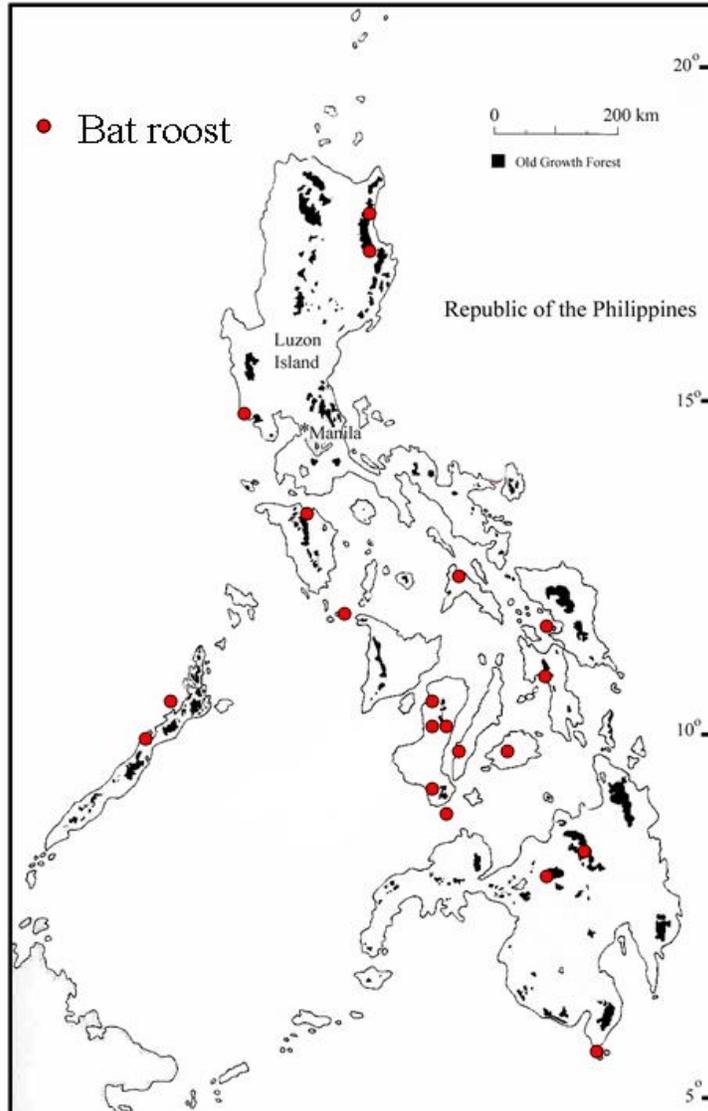


Figure 1. Flying fox distribution in the Philippines.

PROJECT MEMBERS

Our team is made up of students at all academic levels and early-career biologists working for non-profit organizations. There is at least one team member from each major geographical region in the country, so each region has a local bat expert after the project. Our project team represents two local government units, six environmental non-government organizations, 4 universities, and all of the team members plan to continue pursuing flying fox research and conservation in their careers.

Tammy L. Mildenstein, PhD. Candidate, Fish and Wildlife Biology, University of Montana. Principal Investigator/Head project coordinator. Tammy is in charge of analyzing and circulating project results, writing grant proposals, supporting in-country monitoring efforts, developing a standardized, scientifically-defensible monitoring protocol, and liaising with international collaborators. She has pioneered the development of a scientifically-rigorous bat colony survey method that can be used by local communities to monitor their bat populations. Tammy is also lead author on the revision of the IUCN's Action Plan for Old World Fruit Bats, on the scientific advisory board of the Mariana Fruit Bat Recovery Team, and a steering committee member for the Southeast Asian Bat Conservation Research Unit, which is working to coordinate the conservation of bats across Southeast Asia. Tammy worked on the pilot project and conducted master's research on the habitat use of large flying foxes at Subic Bay, Philippines. Currently, she is a full-time Ph.D. student at the University of Montana, USA. (Please see attached curriculum vitae)

Apolinario B. Cariño, M.S. candidate Biology. Biologist in-charge of surveys and training in the central Philippine islands. Poli worked on the pilot project and has worked for five years in research and community education for flying fox conservation in the central Philippines. Poli is a full-time M.S. student at Silliman University and currently the Coordinator of two Federations of People's Organizations.

Sherry P. Ramayla, M.S. candidate Wildlife Biology. Biologist in charge of surveys and training in the Mindanao area. She has begun her M.S. research on the diet of large flying foxes in Mindanao, Philippines. Full-time M.S. student at Mindanao State University.

Edwin Breganza, M.S. Environmental Conservation, University of the Philippines, Los Baños.. Biologist in charge of some surveys and training in Luzon Island and the coordination of the training workshops held in Subic Bay. He worked on the pilot project and works as a consultant for the protected area management office in Subic Bay.

Mylanar Saulog, M.S. Biology, University of the Philippines, Los Baños. Biologist in charge of some of the surveys and training on Luzon Island. She worked on the pilot project and many other conservation biology projects.

Jose Paul Pancho, Graduate student in biology and focusing research on community education. Assistant Researcher, Computer Graphic Artist and Photographer. Paul is in charge of IEC and website development/maintenance.

Rai Kristie Salve C. Gomez, BS, Biology. Rai's senior thesis was on the diversity bats in Mindanao. She now works as a Junior Field Biologist at the Philippine Eagle Foundation. For Bat Count, Rai works on bat conservation in Mindanao and is responsible for roosts in the Davao region of Mindanao.

Bernard Tarun, Biologist in charge of surveys and training in the Sierra Madre area. He worked on the pilot project and has been working with the CROC project for >5 years in the Sierra Madre National Park conducting research on endangered wildlife species.

C.E. Nuevo-Diego, B.S. Wildlife Biology, University of the Philippines, Los Baños. C.E. is coordinating the revision of the IUCN Old World Fruit Bat Action Plan and in charge of all correspondence with fruit bat experts regarding the updating of Red List species accounts. She was involved in first two investigators' masters' research projects on bats and co-authored two papers on the results of those projects. C.E. serves on the flying fox initiative of the SEABCRU collaboration and intends to begin in the master's program at the University of the Philippines, Los Baños, and is hoping to study flying foxes.

Laura Jenkins, B.S. Wildlife Biology, University of Montana. Laura is a newly graduated wildlife student who conducted her senior thesis research on fruit bat hunting in the Philippines trying to understand different perspectives on why hunting is still occurring, although it has been made illegal for the last 15 years. Laura is on the flying fox initiative of the SEABCRU collaboration, and she intends to pursue fruit bat research as a graduate student.

Nina R. Ingle, Ph.D. Biology, Cornell University. She has served in the past as a friend and advisor on the project. Her Master's and Doctoral research included flying fox species in Mindanao, and she is currently working to support conservation biology through a foundation she has started and on a nationwide, Philippine cave bat conservation project.

Section 2:

AIM and OBJECTIVES

Large flying-foxes are optimal flagships for conservation, because they are important ecologically and valued by local communities (Rainey et al. 1995; Mildenstein 2002). Our project aims to continue to promote the long-term, sustainable conservation of globally threatened Philippine flying-foxes and their disappearing forest habitat in the Philippines. We also aim to use our project as a model to promote flying-fox conservation throughout SE Asia and in the Pacific islands.

Our objectives address fruit bat conservation at multiple levels:

- 1) We develop scientific baseline information to focus management activities and gather support for conservation.
- 2) We train students and protected area managers in field monitoring techniques to give them the skills and experience to continue flying-fox conservation management locally.

- 3) We increase public awareness and education in local communities to support conservation efforts of nearby flying-fox colonies.
- 4) At the national scale, we aim to facilitate the involvement of the national government, incorporate our project as a non-profit, and use media to bring national awareness of flying-fox conservation needs.
- 5) At the international scale, we aim to strengthen flying-fox conservation programmes across insular SE Asia and Pacific islands by standardising research and monitoring methodologies, sharing training and education ideas, and strategising conservation efforts at this larger scale.

METHODOLOGY for each objective above

(addressing conservation issues # 1-7 in Introduction)

Scientific baseline information (issue # 1, 2)

We surveyed colonies in the field using population abundance estimation methods proven effective by our earlier work (Mildenstein *in prep.*). We estimate total roosting population sizes using direct and exit counting methods (Racey 1979, Kunz et al. 2009). At the roost, we use Ingle and Heaney (1992) to identify individuals to species (total roost when possible or random sample $\geq 10\%$ total population) to derive proportional species composition (Mildenstein *in prep.*). We use multiple independent observers to demonstrate variance in observer counts and assess error. We compared total population sizes to habitat availability and hunting pressure at each roost to correlate population level responses to these key threats. (Mildenstein *in prep.*)

Train stakeholders (students, hunters, and managers) in field techniques (issue # 3, 5)

We trained protected area managers, local students, hunters, and other conservation workers in our flying-fox roost survey techniques by bringing them into the field with us to the bat roost site and including them in all of our survey efforts at the roost. After data gathering, we talked about flying-fox ecology, explained the survey techniques, and showed them how to use the data to come up with an estimate of population size and species composition of the roost.

Conduct information and education campaigns in local communities (issue # 4, 5)

In buffer zone communities nearest to each bat colony surveyed, we conducted awareness campaigns to increase public support for bat conservation. We read stories about bats and played bat-related games with school-aged kids. With adults, we showed slides and talked about fruit bats and conservation. We also held focal group discussions led by the students, managers, and hunters who accompanied us on our field surveys to discuss the sustainability of local hunting pressure.

Create a national presence by working with the national government and media (issue # 4)

We are developing a relationship with DENR-PAWB through workshops and presentations to support their fruit bat conservation efforts. In turn, we ask for their support of our work by providing us with information on locations of fruit bat colonies that have not been surveyed and by acting as a central repository for data on fruit bat populations in the Philippines.

We have also encouraged international (N=2) and national (N=4) media coverage of fruit bat research and conservation activities and have developed a website encouraging public education and interaction.

Encourage international collaboration supporting flying-fox conservation in SE Asia and the Pacific Islands (issue #6)

See Outputs and Results

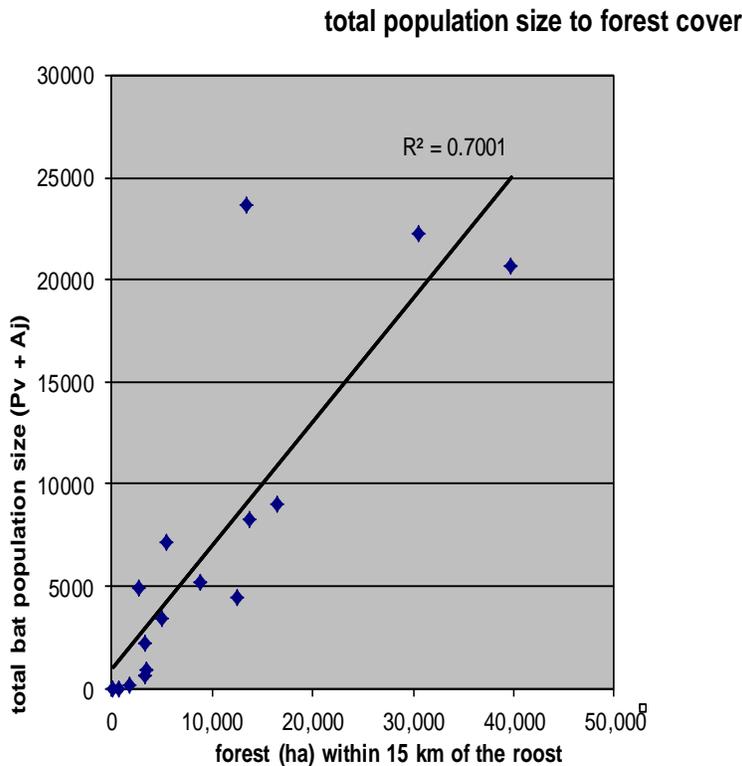
Develop non-invasive techniques for fruit bat genetic and disease sampling (issue #7)

We have pioneered the collection and storage of fruit bat fecal samples for genetic study. We use plastic sheeting under the roost trees to collect fecal samples after the bats have departed for foraging. The samples are cut out of the plastic and put in a paper bag surrounded by silicone desiccant, which dries out the fecal samples and preserves them for transport. (Please see Appendices for methods, results, and laboratory protocols; Mildenstein *in prep*).

OUTPUTS and RESULTS

Scientific baseline information (issue # 1, 2)

We surveyed 9 new colonies and repeated surveys at 5 colonies to estimate population abundance (Table 1, Appendix). Population abundances of the largest two flying-fox species surveyed were tightly correlated with forest cover (Figure 1, below).



Species compositions of the colonies are sharply skewed toward the more widespread species,

and it is likely that the endemic species is more sensitive to loss of forest habitat and roost site disturbance (Mildenstein *in prep.*).

Train stakeholders and conduct public education campaigns (issue # 3, 4, 5)

We trained 84 managers from 6 protected areas, 42 local students, 27 hunters, and 9 other conservation workers in our flying fox roost survey techniques. We also conducted training workshops for 4 university professors and their students to encourage undergraduate students to choose fruit bats as a senior research topic. We conducted education and awareness campaigns in 11 buffer zone communities to increase public support for bat conservation.

We have initiated on-going bat-focused festival activities including the Mud Pack festival at Mambukal Resort, where we have been involved in distributing literature about bats, leading guided tours at the bat roost, and giving a slideshow and presentation to >56 school-aged kids. Approximately 300 participants attend this festival each year and learn about bats.

Bat Count has also supported interpretive dance pieces and displays at the Annual Negros Oriental Provincial Festival, in which numerous local community members wear bat-like costumes and depict bat ecology and conservation needs through dance. The number of viewers at a performance can be well over 1000 (see picture above).



Create a national presence by working with the national government and media (issue # 4)

See methodology section.

Encourage international collaboration supporting flying-fox conservation in SE Asia and the Pacific Islands (issue #6)

We conducted fruit bat workshops/meetings at 4 international conferences (SE Asia Regional Bat Research Conference in Thailand 2007 (photo below), Indonesia 2011; Society for Conservation Biology Annual Symposia, South Africa 2007; Mariana Fruit Bat Recovery Meetings, Guam 2008; involving a total of 281 participants) and 4 Philippines national wildlife conservation conferences (Wildlife Conservation Society of the Philippines 2006, 2007, 2010; IUCN Global Mammal Assessment 2006; involving 89 participants) to encourage discussion among researchers and managers about fruit bat conservation priorities and collaboration potential.

Our field methods for population abundance estimation and monitoring have been adopted as the standard monitoring protocol for endangered fruit bats in the Mariana Islands and



are being incorporated in a regional monitoring protocol for large fruit bats across Southeast Asia. Our methods have also been adopted by the EMPRES programme of the United Nation's Food and Agriculture Organization for surveying bat roosts for emerging infectious diseases (Mildenstein 2011; see Appendix for publications).

Finally, we initiated a revision of the IUCN's Old World Fruit Bat Conservation Action Plan, for which we are identifying experts and soliciting revisions to the outdated species accounts in this threatened taxon.

ACHIEVEMENTS and IMPACTS

Scientific baseline information (issue # 1, 2)

The lack of baseline population size and distribution information is a key concern for fruit bat conservation throughout their range in the Old World. Our surveys in the Philippines have provided valuable information on population sizes and distributions of the world's largest bats and justified the listing of both of our study species on the IUCN Red List of Endangered Species (Mildenstein et al. 2008; Bates et al. 2008). We now have established baselines to which the results of future population surveys can be compared to evaluate and track population trends. Also, the DENR-PAWB branch of the Philippines government is using our population measures to identify conservation priorities among fruit bat colonies and effectively channel limited resources for their protection.

Train stakeholders (students, hunters, and managers) in field techniques (issue # 3, 5)

By training students and managers in fruit bat identification and population abundance estimation techniques, we have magnified our fruit bat conservation impacts across the Philippines. At least 8 of the students we trained in field techniques have gone on to focus their academic research on large fruit bat population ecology, and management groups at 6 fruit bat colonies have initiated repeated counts in subsequent years to track their local bat populations.

Hunters who have accompanied us in the field generally show an appreciation for the limited size of fruit bat populations and seem to understand the risks of unregulated hunting. Before taking part in the surveys, most hunters guess local fruit bat population sizes are in the "millions". However, after counting the bats themselves and finding at most several thousand individuals, they are noticeably surprised and concerned about on-going hunting pressure. They initiate discussions with our group about how many could be sustainably harvested and often show an interest in training other hunters in neighboring communities to count bats, so they too, might limit their consumption. Many hunters trained by our team stay involved in fruit bat surveys by becoming the local fruit bat guides for future monitoring efforts in the field.



Conduct information and education campaigns in local communities (issue # 4, 5)

Encouraging awareness about fruit bats has proved very influential to local conservation success. Information and awareness campaigns have led to bat roost sites becoming locally protected sanctuaries at two colonies and encouraged the showcasing of bat colonies as eco-tourist attractions at three other roost sites. Additionally, through promoting bat education and awareness in local communities, we often identify local community members who are particularly interested in the fruit bats and who become our local champions and/or spokespersons supporting fruit bat conservation. These are the individuals who contact us year after year to report on the status of their fruit bat colonies, and who alert us when their local colony seems to be in danger.



Create a national presence by working with the national government and media (issue # 4)

Like many countries in which fruit bats are found, the Philippine government has limited resources for implementing wildlife protection. Fruit bats are just one of many endangered taxa in the Philippines and as such receive very little government-level attention. However, as our project and, fruit bats in general, have become more and more known through public awareness campaigns and media coverage, the Protected Area and Wildlife Bureau (PAWB) of the Philippines Department of Environment and Natural Resources (DENR) has become more interested in collaborating with our project. DENR-PAWB has responded favorably to our invitations to join us on surveys in the field, and on three separate occasions have requested us to present our project and conduct workshops at their main office in the country's capital. The DENR-PAWB office could be a very powerful force in securing fruit bat conservation, and we are working to build on this relationship by providing more opportunities for collaboration.



Encourage international collaboration supporting flying-fox conservation in SE Asia and Pacific Islands

One of the key conservation concerns for fruit bats in SE Asia and the Pacific Islands is the lack of networking among the few conservation programs in these areas. Our international workshops have been very successful in stimulating cross-boundary collaborations and a deeper understanding of region-wide fruit bat conservation needs. In Thailand, our workshop (photo below) was attended by 127 participants from 22 countries across SE Asia and the Pacific Islands. We led a brainstorming session of priorities for fruit bat research and conservation

across the region and developed a list of major constraints to achieving fruit bat conservation goals (Mildenstein *in prep.*).

The overwhelming success of this workshop led to our team being asked by the IUCN Bat Specialist Chair to take the lead on revising the 1992 Old World Fruit Bat Conservation Action Plan. By incorporating expert opinion on fruit bat conservation priorities, we will be able to update the Action Plan and effectively guide future fruit bat conservation and research.



As we have become recognized for our fruit bat conservation and population biology efforts, we have been invited to share our experiences and sit on many expert panels including: IUCN's Bat Specialist Group, U.S. Fish and Wildlife's Mariana Fruit Bat Recovery Team/Scientific Advisory Board, National Science Foundation's Southeast Asia Research and Conservation Network. In addition to being great honors, participating on these expert panels have given us many opportunities to both contribute to and learn along with the successes of other large-scale fruit bat conservation efforts.

Develop non-invasive techniques for fruit bat genetic and disease sampling (issue #7)

Although fecal samples have been used as a non-invasive source of DNA in many taxa, nobody has tried to extract fruit bat DNA from fecal samples. Fruit bat feces are made predominately of juice, so they are relatively small and pass quickly through the fruit bat digestive track suggesting a low yield of fruit bat cells. However, we have been 100% successful in extracting fruit bat DNA from fecal samples (Mildenstein 2010; Mildenstein *in prep.*), which holds great promise for fruit bat conservation. Fruit bat feces can be collected non-invasively through simple and inexpensive techniques. This removes handling risks to the fruit bats, while opening up genetic study to students and local biologists who cannot afford the capturing equipment used in tissue collection. We are very excited to offer this new technique to fruit bat research and see how it will improve fruit bat conservation efforts.



Section 3:

CONCLUSION

We are pleased with Bat Count Philippines' contributions to fruit bat conservation since receiving our CLP continuation award in 2006. We have collected important baseline information on previously unknown colonies increasing by 50% the number of surveyed colonies in the Philippines. Our survey results suggest that forest availability is highly correlated with fruit bat population size, raising the concern about fruit bat conservation given the large-scale reduction of forest habitat in the Philippines (Kummer 1991, WCSP 1997). Our project has also

built capacity among local stakeholders, resulting in more fruit bat research and conservation monitoring activity independent of our team's efforts. Our public education and outreach efforts have supported the local protection of 4 fruit bat roost sites and encouraged other protected area managers to consider roost site protection measures. And, our efforts to build a national fruit bat conservation programme have led to a productive and supportive relationship with the Philippines DENR-PAWB office, which has shown an unprecedented interest in playing an active role in fruit bat conservation management. Most notable among our project's successes are the numerous ways we have expanded into supporting international fruit bat conservation efforts. Our project's survey methodology has been adopted by 3 internationally-active conservation management groups as their standard fruit bat population monitoring protocol. We have been invited to sit on the expert panels of 4 prestigious international bat conservation efforts. Finally, we are leading the revision of the IUCN's fruit bat Action Plan, which will guide fruit bat research and conservation for decades to come.

Problems encountered and lessons learnt

- *Which project activities and outcomes went well and why?*

By far, one of the most immediate and obvious successes of Bat Count Philippines is the enthusiasm stimulated for fruit bat conservation during our community-based field work and training. Local communities are generally thrilled to have us visit and bring them with us on our field survey missions. They are excited to learn about bats and their local ecology, and they are eager to play a role in bat conservation.

- *Please detail any problems that the project encountered or deviations from original project plans. Describe how these problems were addressed and what solutions were found to deal with these issues.*

One of our original project goals was to set up a Memorandum of Agreement (MOA) with the Philippines Department of Environment and Natural Resources to support future collaborative efforts for fruit bat conservation. However, it has turned out that forming a MOA between our program and this government entity is much more loaded with expectations than we anticipated. Because our project has become well-known among conservation projects, the DENR seems to have the misunderstanding that we are a very wealthy project. We have found ourselves working very hard to set expectations about how we may work together without incurring large costs that detract from our limited budget and conservation mission.

Another goal we have been rethinking is under what conditions we will go about becoming a registered non-profit in the Philippines. We have been an active team for almost ten years. However, during this time the size and experience of our team has fluctuated greatly. With a large and experienced team, the responsibility of becoming a non-profit can be easily shared and balanced among leaders. However, now that many of those original members have started their careers and families, and thus shifted their priorities away from Bat Count, we do not have the depth and commitment in our team to support the a non-profit organizational framework.

- *Briefly assess the specific project methodologies and conservation tools used.*

Our field methods for fruit bat population abundance assessment and monitoring are extremely simple and easy to use, making them ideal for training inexperienced community members. Because rough population abundance estimation can be achieved in expensively and in just a couple of days, these methods make it easy to encourage local managers to repeat surveys in the future without our help. Our capacity building and public awareness techniques through hands-on training have been extremely well-received, and we would like to build on these to create a tool-box for other fruit bat conservation programs facing similar capacity-building challenges.

- *Please state important lessons which have been learnt through the course of the project and provide recommendations for future enhancement or modification to the project activities and outcomes.*

The most important lesson we have learned over the course of our project is the importance of steady income for project leaders. Although our project has been run by many earnest and committed volunteers, its weakness lies in the lack of continuity in its management. In the future, we aim to provide our team leaders with dependable steady income and to join forces with other conservation groups to supplement the peer support and infrastructure we need to maintain our conservation activities.

In the future

Although our project and funding have run their course, we still remain active in fruit bat conservation throughout the region. Three Bat Count team-members are voluntary participants in a 5-year project coordinating bat conservation across Southeast Asia (SEABCRU). Two Bat Count team-members (TM, CEN) will continue to support fruit bat conservation through their revision of the IUCN Fruit Bat Action Plan. The team leader (TM) continues to serve on the IUCN Bat Specialist Group, the Mariana Fruit Bat Recovery Team, and the SEABCRU steering committee, and as such, will continue to support fruit bat conservation in Southeast Asia and the Pacific Islands.

There is still a lot to be done to secure fruit bat conservation in the Philippines, and many groups are looking to Bat Count Philippines to play a lead role in the future of fruit bat conservation in this biodiverse region. The Bat Count project leader intends to seek funding to support three regional project managers to continue fruit bat roost surveys and monitoring in three regions of the Philippines. She will also continue to mentor students in the Philippines and United States, encouraging them to focus their academic research on topics that support fruit bat conservation.

Section 4: APPENDICES

FINANCIAL REPORT

Pre-project expenses:

Administration	
Communications	52
Insurance (equipment)	130
Visas and permits	75
Freight	123
Equipment & General for fieldwork	
Field rations	125
Medical	78
Scientific equipment	27
Communications	73
Maps	150
Satellite imagery	65
GIS support	130

Action Plan support:

C.E. 250/month x 9 months	2250
Internet services 22/month x 4.5 months	198

Field expenses:

2006 SUBIC/PALAWAN SURVEYS

Living costs	
(Manila for PIs coordinating/project)	450
3 people x 25.00/day x 6 days	
Palawan 4 sites x 11 people x 5 days x 4.0/day	880
Local guides	125
Travel allowance (incl. boats, vehicle use, fuel cost)	534
Miscellaneous (phone communications, tips, medical)	78

2009 SUBIC, BORACAY, MAMBUKAL SURVEYS

Living costs	
Manila for PI's	
3 pax x 31/day x 6 days	558
Subic (Edu, Laura, T, Poli) room	
4 pax x 4 days x 12/day	192
Food	
4 pax x 4 days x 20/day	320
Boracay (8 pax) room	
4 rooms x 4 days x 22/day	352
Food	
8 pax x 4 days x 20/day	640

Travel		
Car to Subic and back		112
Car and gas in Subic (4 days x 23/day)		92
Gas		47
Flights to Boracay		
3 x 79		237
Boat/taxi in Boracay		
8 x 15		120
Boat/taxi to Bacolod		
8 x 24		192
Bus/Taxi to Mambukal		
15 x 8		120
MALAGOS SURVEY		
Flight DUM-MNL-DAVAO		133
Travel		23
Per diem 4 days x 17		68
MINDORO SURVEY		
Flight DUM-MNL-Mindoro x 2 pax		338
Taxis/bus 2 x 12		23
Guides 4 x 10		40
Per diem 4 days x 12/day x 7 pax		336
LEYTE SURVEY		
Boat Negros-CEBU-Leyte		24
Taxi/bus to LSU		7
Guides 2 x 5		10
Per diem 4 days x 16/day x 5 pax		320
NEGROS SURVEYS (4 roosts)		
Local travel 4 roosts x 23		92
Guides 4 x 21		84
Per diem and guest food		
4 x 2 days x 20/day		160

Training:

Mambukal		
35 people x 4 days x 24/person/day		3356

Post-project expense:

Administration (mailing expenses for final reports, SEC)	85
Report production	20
Photography	20
Travel to conferences	

2006 GMA/ WCSP Palawan, Philippines		
International (2 investigators)		
Airfare	1210 x 2 people	2420
Domestic	137 x 2 people	274
Conference registration fee		100
Per diem	8 days x 4 people x 50/day	1600

2007 SEABCRU-Thailand		
International (1 investigator from USA)		
Airfare		1440
Domestic (BKK to Phuket)		156
Conference registration fee		110
Per diem	5 days x 50/day	250

International (3 investigators from Philippines)		
Airfare	559 x 3 people	1677
Conference registration fee	85 x 3	255
Per diem	5 days x 50/day x 3 pax	750

2010 WCSP		
Domestic airfare (MNL – Legaspi)		142
Conference registration fee		82
Per diem 3 days x 20/day		60
Manila 2 days x 50/day		100
Manila taxis and airport fare		43

2011 WCSP for CE		
Travel (ferry/airfare)		149
	Airport ticket	78
Conference registration fee	55	55
Per diem	4 days x 20	80

2011 SEABCRU (BOGOR) for CE		
Airfare (MNL-SING-CGK)		495
Taxi to Bogor (rt)		15
Per diem with roommate	45 x 8 days	360
Singapore hotel	27 x 2 days	54
Per diem while traveling	3 x 20/day	60

TOTAL BUDGET 24,469

Other funding for project:

Bat Conservation International (not itemized above)	4000	(for genetic work)
Lubee Bat Conservancy (not itemized above)	5000	(for Action Plan revision)
University of Montana, TA stipend (not itemized above)	7000/year x 1.5 years	
SEABCRU	3 Bat Count members to Bangkok conference,	
	2 Bat Count members to Bogor meetings/conference (not itemized above)	

Field Data to be included here after publication (exp. 10/2011)

Popular articles related to the project:

Publications and proposed papers resulting from the project:

- Mildenstein, Tammy L. 2010. Chapter 2: Natural history, ecosystem services and socio-economic value of bats, In: S.H. Newman, H. Field, J. H. Epstein and C. de Jong (editors). Investigating the Role of Bats in Emerging Zoonoses: Balancing Ecology, Conservation, and Public Health Interest. FAO Animal Production and Health Manual, No.11. Food and Agriculture Organization of the United Nations. Rome (available at http://www.fao.org/avianflu/en/wildlife/info_res.htm) (ATTACHED)
- Mildenstein, Tammy L. 2010. Chapter 3: Bat Population Abundance Assessment and Monitoring, In: S.H. Newman, H. Field, J. H. Epstein and C. de Jong (editors). Investigating the Role of Bats in Emerging Zoonoses: Balancing Ecology, Conservation, and Public Health Interest. FAO Animal Production and Health Manual, No.11. Food and Agriculture Organization of the United Nations. Rome (available at http://www.fao.org/avianflu/en/wildlife/info_res.htm) (ATTACHED)
- Mildenstein, T.L. 2010. In search of bat splats: Droppings may yield genetic secrets of flying foxes. BATS 28(3):6-7. (ATTACHED)
- Bates, P., Francis, C., Gumal, M., Bumrungsri, S., Walston, J., Heaney, L. & Mildenstein, T. 2008. *Pteropus vampyrus*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. <www.iucnredlist.org>. Downloaded on 14 October 2010.
- Mildenstein, T., Cariño, A., Paul, S., Heaney, L., Alviola, P., Duya, A., Stier, S., Pedregosa, S., Lorica, R., Ingle, N., Balete, D., Garcia, J.J., Gonzalez, J.C., Ong, P., Rosell-Ambal, G. & Tabaranza, B. 2008. *Acerodon jubatus*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. <www.iucnredlist.org>. Downloaded on 17 September 2010

Proposed papers:

My dissertation research focus is different than the Bat Count Philippines project focus, but the two complement each other well and make use of some of the same data. The following are my proposed chapters for my dissertation, which I will make available as Appendices to the report as soon as they have been approved by my committee.

- Chapter 1: Introduction/Overview to fruit bat conservation needs in SE Asia.
- Chapter 2: From co-existence to exclusion: mechanisms behind the generalist replacement of specialists in the face of disturbance.
- Chapter 3: Anthropogenic disturbance leads to competitive advantages for generalist species and unstable coexistence with specialists.
- Chapter 4: Monitoring trends in colonizing Old World fruit bats: combining community-based monitoring with scientific rigor.
- Chapter 5: Fruit bat feces as a non-invasive source of DNA for conservation genetics research of endangered fruit bats
- Chapter 6: ECOS Chapter: Getting your hands dirty is a great learning tool! Getting the most from visiting ecologists in the classroom.

Bibliography (literature cited and other important articles)

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Distribution list

No copies of this report have been distributed beyond the Conservation Leadership Programme.



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