BELIZE FOUNDATION FOR RESEARCH AND ENVIRONMENTAL EDUCATION THE BLADEN REVEAUEV 2014

Letter *from the* Executive Director

HAPPY 20th!

Yes, it's hard to believe, but 2014 marks the 20th year anniversary of the founding of BFREE. Back in 1994, it was just an idea, but with the pro-bono help of attorneys like David Marlin, David Winter, Tom Ankersen, and Ralf Brookes, BFREE moved from an idea to an officially registered 501(c)3 non-profit organization.

Once established, work began on the development of the field station and bringing together stakeholders in Belize and abroad who cared about the future of the Bladen Nature Reserve and surrounding protected areas. These stakeholders included government and non-government organizations, community representatives and civil society.

The challenges seemed insurmountable at that time. The Bladen was a 'paper park,' just a name on the map, virtually unexplored. The threats to the area, such as illegal logging, hunting, fishing, looting of the ancient Maya ruins, and possible de-reservation were small in scale but seemed immense. BFREE was the only presence in the area, but with just a few tents staked out by the river our capacity was quite limited. Nevertheless we got to work, and slowly but surely, with perseverance and the dedication of many people, the Bladen is now well known and has a management program in place. BFREE has grown into a fully functioning biological field station, contributing on many levels to the long-term conservation of the Bladen and the greater Maya Mountains.

As other tropical forests throughout the Americas have diminished in size and have become segmented, this area has now become the largest expanse of continuous tropical rain-



forest north of the Amazon. The work that we do is now more vital than ever. Our educational programs serve to inspire and motivate people to take action and contribute toward protecting our shared environment and caring for our natural resources for future generations. The research that is done at the field station contributes to a better understanding of this ecosystem and the important part that it plays in the health of our planet and all of its inhabitants. One thing I have learned over the past 20 years is that conserving tropical rainforest is all about working with people. People make choices, and the choices we all make determine whether the forests stand or fall, and whether the wildlife remains or is only in books and movies in years to come.

The past year has brought to fruition many of my long-term goals for BFREE. Foremost among them: having local Belizeans take more of a management role and a sense of responsibility for the field station and its operations. The staff of the BFREE field station are the heart of the organization, and they work tirelessly to ensure that the experiences BFREE provides to all of its visitors are educational, safe, memorable, and often life-changing. The staff also ensure that the area is patrolled and kept secure, and that facilities are maintained and continually improved.

I feel honored and very fortunate to have such dedicated and capable staff managing the field station, and appreciative of so many committed and passionate individuals who have believed in the BFREE mission and have helped support BFREE's goals. Our work is not done. Many challenges remain. We can only achieve our mission of "conserving the biodiversity and cultural heritage of Belize" with the help of our

supporters and friends. Thanks to all those who have helped BFREE during these past 20 years, and I encourage your continued support as we move ahead. I hope you enjoy reading this issue of the Bladen Review, and I look forward to the next 20 years with optimism, enthusiasm, and excitement.

In conservation and stewardship,

Jul A. Mali

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THE RESEARCH COMPOUND

BFREE is proud to announce that the new research compound is officially open! The compound offers visiting researchers, professors and other guests, comfortable and private accommodations within an easy walk to the lab, bunkhouse and other facilities. The compound consists of three cabins: Fer de Lodge, Harpy House, and Casa Criollo, a composting bathroom, hot/cold shower, and the heart of the facility – the lab. All are nestled comfortably in the forest and though very private are centrally located.

Each cabin is furnished with two handcrafted hardwood beds, a desk

and chair, storage for clothes and personal belongings, and a hammock. Each is outfitted with a colorful hand-painted Mexican ceramic sink, beautiful hardwood floors, screened walls and skylights making them possibly the brightest facilities at BFREE.

The compound was made possible through funding offered by many dedicated donors during the past year who support developing this type of infrastructure at the field station. A special thanks to David and Jackie Marlin and Jamie Rotenberg and Vibeke Olson - each couple sponsored the construction of a cabin. Thanks again also to Dr. Ron Caldwell and Lincoln Memorial University for co-sponsoring the Rainforest Science Cooperative Lab and much of the equipment within. Facilitating research on the surrounding area is paramount to BFREE's mission, and the research compound at BFREE is an important step to achieving this goal.

BFREE Hires New Ranger

Last year's successful fundraising campaign enabled BFREE to re-establish a protection program for the 1,153 acre property. Sipriano Canti was hired and outfitted with gear including a Honda ATV to patrol the vast, forested area. Canti, currently the Chairman of Golden Stream Village, is well respected throughout Belize and has a long history of experience as a ranger, including as the Head Ranger for the Bladen Nature Reserve from 2002 - 2007. He works closely with the Forest Department, the Police Department, the Belize Defense Force as well as numerous non-government organizations.

Canti has a passion for protecting and conserving Belize's natural resources. He has played an integral role in creating the existing ranger protocols and will be instrumental in expanding the protection program over the coming years.



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CRITICALLY ENDANGERED TURTLES Find New Home at BFREE

BY JACOB MARLIN Executive Director, BFREE

The Central American River Turtle (*Dermatemys mawii*) is a large, aquatic freshwater turtle found along the coastal lowlands of southern Mexico, northern Guatemala and Belize. Locally known in Belize as the Hicatee, *D. mawii* has been intensely harvested for its meat, which is consumed by rural peoples and sold in urban markets. It has been virtually eliminated from much of its former range in southern Mexico, while its status in Guatemala remains unclear. The lone surviving representative of the family Dermatemydidae, *D. mawii*, is a unique evolutionary lineage. Classified as Critically Endangered (facing an extremely high risk of extinction) by the IUCN Red List, it is ranked 15th in the report *Turtles in Trouble: The World's 25 Most Endangered Tortoises and Freshwater Turtles – 2011*, by the Turtle Conservation Coalition.

After a country-wide survey conducted by The Turtle Survival Alliance (TSA) to determine the status of the Hicatee in Belize in 2010, the TSA began to collaborate with BFREE to construct a captive breeding and research facility at BFREE. This facility, the Hicatee Conservation and Research Center (HCRC), was designed to mimic wild conditions while using sustainable low cost/ low maintenance methods. It is our hope that captive hatched turtles should be available to restock depleted wild populations, create new populations, and at the same time take pressure off of wild populations by developing sustainable methods for farming

The Hicatee Conservation and Research Center was designed to mimic wild conditions while using sustainable, low cost, low maintenance methods.

Hicatee that can be implemented easily throughout Belize and the entirety of their range.

In March 2014, with the HCRC ready for turtles, the TSA and BFREE began to assemble a team of expert field herpetologists to participate in a collection trip endorsed by the Belize Fisheries Department. The team, led by Dr. Thomas Rainwater and Jacob Marlin, focused on the Sibun and Belize River Valleys. Three pickup trucks, a john boat, and six canoes were available throughout the four-day event.

Nesting areas were created with three types of substrate (sand, mulch and muck) to determine which the Hicatee will prefer.

The team, consisting of up to 12 people on a given day, divided into three groups: one used diving methods, and two teams used trammel nets based out of canoes. Teams worked in tandem for long hours during these days targeting large adults. Visibility

for long hours during these days targeting large adults. Visibility was poor due to recent rains, but the trammel nets were vital and the teams successfully collected 14 Hicatee – two males and twelve females. Turtles were captured and brought to a holding facility, where they were weighed, sexed, measured, marked, photographed, and then transported south to the HCRC at BFREE. Serendipitously, on 26 March, during their first day of field work, the team learned that the Belize Fish-

eries Department had just confiscated eight live turtles from illegal hunters. The team quickly contacted the Fisheries Department and requested that the turtles be transferred to BFREE for the breeding program. Permission was granted, boosting the number of individuals collected and confiscated to 22 individuals (three adult males, 13 adult females and six sub-adult females).

In recent months the turtles appear to be adapting well to their new home. BFREE staff members, Marlyn Cruz, Fernandes Sho, and Elmer Tzalam, are responsible for feeding and observing the turtles. The primary natural diet of Hicatee, *Paspalum paniculatum*, a weed like grass that BFREE has been propagating around the perimeter of the breeding ponds and other locations

at the field station, has been taken with enthusiasm. Feedings of Paspalum and other natural diets including leaves and local fruits take place three times per week, and observations are conducted regularly. Artificial nesting areas have been constructed using a variety of substrate, and we hope that with a little luck, egg-laying will take place this year.

Portions of this article were first printed in the 2014 edition of Turtle Survival Magazine.

THE TURTLE SURVIVAL ALLIANCE

BY RICK HUDSON President, Turtle Survival Alliance

The Turtle Survival Alliance (TSA) selected Belize as the target country for this initiative for a number of reasons. First, it is regarded as the "stronghold" for the species, and still supports some robust wild populations, though the overall trend is one of steady decline. Belize has not seen as dramatic population crashes as southern Mexico. Belize also has a "friendly climate" for those wanting to begin conservation and research programs, and we have received good support and encouragement from the Fisheries Department and others. Finally, there are a number of local NGOs in Belize that share our concern for the future of the Hicatee and have made that species a conservation priority.

BFREE was selected because of sev-

eral factors. First, Jake and I go back a long way. We met when he worked as a herpetologist in the zoo field. I kept up with what he was doing once he left the zoo world, and when the idea arose to launch a Hicatee conservation program, I immediately thought of him. We basically rekindled our friendship over this project. There is a level of trust there that is very important to this kind of partnership. And I know that Jacob is a "git 'er done" kind of guy.

Additionally, the fact that BFREE is remote and protected is very important to ensuring a successful project. BFREE also has motivated, experienced and resourceful staff and is accustomed to hosting student researchers, which could be really important to reaching some of our goals.



COLLECTING WEATHER AND CLIMATE DATA

The new station at BFREE records seven weather variables every hour

> Bottom left: Dave Buck, Tropical Program Director at Biodiversity Research Institute, dismantled the old weather station during his stay at BFREE earlier this year.

BY DR. ROBERT KLINGER Ecologist, US Geological Survey and BFREE Board Member

Weather and climate are among the most vital data a field station such as BFREE can collect and make available to researchers and other interested persons or groups. Prior to receiving funding in 2005 for a Weather Hawk weather station, we had been collecting basic temperature and precipitation data by hand with a high-low thermometer and plastic rain gauge. Increasing needs of researchers, conservation planning, and education groups drove us to expand the data we were collecting. Moreover, there were no personnel dedicated to collecting the data, which created the potential to introduce ob-

Our goal is to have weather data available at www.bfreebz.org in 2015.

server variability and gaps in the data. Finally, there was no systematic management of the records or dedicated computer for researchers and education groups to access the data on-site. The weather station virtually eliminated these problems and, to the best of our knowledge, has enabled us to collect the longest time series of climatic conditions in southern Belize.

In 2013, Norcross Wildlife Foundation provided funds for a replacement weather station because our Weather Hawk had deteriorated to the point that it was nearly inoperable. With guidance from BFREE's Science Committee, we were able to purchase and install a new weather station this year. The immediate benefit of replacing the weather station was continuity in a systematic process for collecting, managing, and accessing short-term weather and long-term climate data. Data on seven weather variables are collected hourly and stored in a logger, then

downloaded weekly to a personal computer.

Our science staff and groups from several colleges have managed and summarized the annual data as an ongoing, longterm project on climate patterns in the region. Over the last eight years the weather and climate data have been integrated with many ecological research, inventory and monitoring programs. Our goal is to have the weather data available on our website, bfreebz. org, in 2015 so that this important information is readily accessible to those who are interested.



WHY THERE IS HOPE FOR

BY HOWARD GOLDSTEIN Independent Researcher

Eric Anderson and Howard Goldstein measure a female Hicatee

"So are you in Belize on vacation?"

"Not exactly...actually, I'm here with a research team for a Hicatee conservation project."

"Oh yes, the Hicatee! Have you ever eaten it?"

"No, I haven't. Do they taste good?"

"Yes, very good. The thing is, you want to serve it over white rice with a light coconut milk sauce. If you just cover it with curry, you don't really taste the Hicatee."

The above is a very good approximation of a conversation I had with the manager of the car rental agency across the street from the International Airport on my first day in Belize. I had several similar conversations with different people, the major distinctions amongst them being exactly how Hicatee is best served. Another fellow was a fan of curried Hicatee. A third was emphatic that Hicatee does not need a sauce or a curry and should always be served in its own gravy.

Successful captive breeding of Hicatee and research of wild populations are only two-thirds of the strategies needed to save this species; the final and equally crucial piece of the triad is education and social change.

Dermatemys mawii is critically endangered due to over hunting, and these conversations with local Belizeans during my first few hours in the country provided firsthand experience with just how culturally ingrained Hicatee consumption is in Belize. It was also the perfect demonstration of why successful captive breeding of *D. mawii* and research of wild populations are only two-thirds of the strategies needed to save this species; the final and equally crucial piece of the triad is education and social change.

Ironically, the very cultural elements that have rendered *D. mawii* endangered and make Hicatee consumption so difficult to stop may prove the most powerful enabler for successful conservation. The ace in the hole is precisely the fact that Belizeans value the Hicatee as part of their cultural heritage and as a highly desired resource. A

Howard Goldstein was a field team member during the March 2014 expedition to collect Hicatee for the captive breeding program at the Hicatee Conservation and Research Center.

the HICATEE

far more uphill battle is getting people to protect species they hate or fear or just don't care about. If the day comes when Belizeans can't serve Hicatee for Easter dinner because there are no Hicatee, the animal's demise will be widely lamented and regretted. Belizeans want for there to always be enough Hicatee for themselves, their children, and their grandchildren to enjoy.

Successful breeding of Hicatee in captivity is crucial to maintain a numerically and genetically viable insurance population, and to allow for reintroductions and augmentations into the wild. Captive breeding will also allow Hicatee to be commercially farmed, providing a non-wild source for the country's cultural culinary demands. Such farms would employ Belizeans and drive poachers out of business by dramatically undercutting the prices of poached wild Hicatee (which is becoming increasingly expensive as stocks diminish). Hunting wild Hicatee for personal use is an important

cultural activity and tradition for some Belizeans. With most Hicatee meat for mass consumption being farmed and a much smaller pool of traditional hunters harvesting only for their tables, the ecological, aesthetic, and scientific value to society of living, wild Hicatee can create the conservation social clime necessary to ensure the success of wild recovery. Belize can have its Hicatee, and eat it too.

The glue that will ultimately tie this all together is the people of Belize. And just as my time in Belize showed me the extent of the overharvest problem, it also gave me firsthand experience with the progress that is being made. I saw long time Hicatee hunters work with the research team to find turtles for the captive breeding program. Rather than viewing conservationists as the enemy, I imagine they agreed with the need to restore the Hicatee for future generations. A collecting site at the Sibun River, once a Hicatee protected reserve but sadly decommissioned, nevertheless proved a bright spot. The local landowners who granted us access, did not eat Hicatee, enthusiastically endorsed conserving them, and to some degree seemed to protect them. We were told that Hicatee poachers very rarely invaded their stretch of the Sibun. Maybe most important of all, the eight confiscated turtles and the arrests of the poachers made national Belizean news, and stiff sentences were handed down. These illegally netted Hicatee joined the founder population of a program to save their species, and there was little public sympathy for the poachers.

If public acceptance of conservation efforts for the species keeps building, perhaps some of the future Hicatee hatched at the Hicatee Conservation and Research Center will someday grow to great size and old age; back in the winding rivers and flooded sloughs of their ancestors.

Steven Brewer collecting foliage from the top of a canopy with a pole cutter.

TROPICAL BIOGEOCHEMISTRY: Investigating Nitrogen and Phosphorus Cycles in the Bladen Nature Reserve

BY JOY B. WINBOURNE PhD Candidate, University of California, Davis

Tropical forests play a disproportionate role in regulating global climate; while only representing 12% of the land surface, tropical forests perform 40% of all photosynthesis on land, helping to remove carbon dioxide from the atmosphere⁽¹⁾. Nutrients – primarily nitrogen and phosphorus – limit plant growth and therefore the ability of forests to capture carbon via photosynthesis – especially with rising levels of atmospheric carbon dioxide due to human activity^(2, 3). Understanding the factors that influence the abundance of these essential plant nutrients in tropical forests will improve our ability to predict the pace and magnitude of global climate change⁽⁴⁾.

The Houlton biogeochemistry research group, located at the University of California – Davis (UCD), has been collaborating with BFREE botanist and UCD alumnus Dr. Steven Brewer since 2012. Together, we are investigating how variation in plant biodiversity, soil chemistry, and rock type influence the availability of nitrogen and phosphorus in tropical forests. We are excited to work in the pristine Bladen Nature Reserve in Belize, where the diversity of plant species is the highest in northern Central America⁽⁵⁾ and where the geology is uniquely suited for comparative studies in soil chemistry.

Ecologists have long been fascinated with the puzzling nature of nitrogen⁽²⁾. Despite the fact that 80% of our atmosphere is composed of nitrogen, most ecosystems on earth are limited by this element. This limitation persists because only a select group of bacteria have the abilities to convert atmospheric nitrogen into forms that living organisms can use to produce essential amino acids and enzymes. This process, known as biological nitrogen fixation, is the most energetically expensive process performed by life on earth! It requires a huge amount of carbon and phosphorus to provide the energy⁽⁶⁾. Phosphorus, unlike nitrogen, ultimately comes from rocks. Much of the phosphorus in tropical forests has been weathered out of the soils. Phosphorus can also become bound to the soil and made unavailable to plants⁽⁷⁾. The Houlton lab group and Dr. Brewer



soy windourne collecting samples from a soil pit at the limestone forest site. have been investigating how variation in rock types influences the availability of phosphorus and the process of biological nitrogen fixation in tropical forests.

Within the 100,000-acre reserve there are two different rock types: forests in the northern section grow on volcanic rocks, while forests in the southern section grow on limestone

rocks. We have established study sites on each rock type, and have returned multiple times throughout the year to characterize the chemistry of these forests. At each site we collected leaves, rocks, and soils, which we bring back to the lab to measure their chemical composition. We found that the chemistry of leaves and soil differ substantially between these two rock types. Limestone forests have on average three times the amount of phosphorus as volcanic forests. These differences in phosphorus positively correlate with total nitrogen in the soils and rates of biological nitrogen fixation in decomposing leaves on the forest floor. These results suggest strong interactions

1. A. R. Townsend, G. P. Asner, C. C. Cleveland, The biogeochemical heterogeneity of tropical forests. Trends in Ecology & Evolution 23, 424–431 (2008).

2. P. M. Vitousek, R. W. Howarth, Nitrogen Limitation on Land and in the Sea: How Can It Occur?, Biogeochemistry 1–30 (2007).

3. Y. Luo et al., Progressive nitrogen limitation of ecosystem responses to rising atmospheric carbon dioxide. BioScience 54, 731–739 (2004).

4. Y.-P. Wang, B. Z. Houlton, Nitrogen constraints on terrestrial carbon uptake: Implications for the global carbon-climate feedback. Geophys. Res.

From left to right: Alison Marklein, Seven Brewer, Ben Houlton and Joy Winbourne.

> between the phosphorus and nitrogen cycles in these tropical forests, ultimately influencing the ability of these systems to photosynthesize and capture atmospheric carbon. We hope in the future to begin to explore how nutrients and plant biodiversity influence carbon storage in these forests.

Lett. 36, L24403 (2009).

5. S. W. Brewer, M. A. H. Webb, A seasonal evergreen forest in Belize: unusually high tree species richness for northern Central America. Botanical Journal of the Linnean Society 138, 275–296 (2002).

6. J. Raymond, The Natural History of Nitrogen Fixation. Molecular Biology and Evolution 21, 541–554 (2003).

7. T. W. Walker, J. K. Syers, The fate of phosphorus during pedogenesis. Geoderma 15, 1–19 (1976).

Why Study Soils in the Bladen?

BY DR. STEVEN BREWER Botanist, Copperhead Consulting, LLC and BFREE Board Member

When Marc Rejmánek and I first explored the Quebrada de Oro tributary in 1996, we made a point of hiking beyond the riverside forests and limestone hills and into the volcanic geology we had located on maps of the geology of the Maya Mountains. Going from the limestone forests into the volcanic forest was like going through a door into another world, botanically speaking: the contrasts in plant species and physical structure of the two forests drew a stark line across the landscape. Since that time I have often thought about how the varying geological substrata influence soils, and how differences in soil manifest differences in vegetation across the landscape of the Bladen Nature Reserve (BNR). Being consumed with other matters of plant ecology, I never delved into the Bladen soils, but I always wished for someone who had the time and expertise to begin to answer some of the questions

Of all the tropical American landscapes, the Bladen Nature Reserve has largely escaped the modern alterations by humans, and it can be considered as intact an ecosystem as there is left in the Americas.

I had about soil influences on plants in the Bladen.

Whoever decides to address such questions will find that the landscape of the southeastern Maya Mountains offers an ideal setting for comparative soil-plant ecology. The BNR has largely escaped the modern alterations of the tropical American landscapes by humans, and it can be considered as intact an ecosystem as there is left in the Americas. Combined with its relatively intact state is its inclusion of several very different types of geological substrata lying side by side. In order to conduct similar comparative soil-plant studies elsewhere, one would find it difficult to escape the confounding effects of past and present human influence. Moreover, one would have to travel to very different areas far apart to find such different types of geology, and this too would introduce uncontrollable variables into any comparative studies. I look forward to seeing what else the Houlton lab discovers as it builds on the work that Joy has started in the BNR.

HOW BFREE REVITALIZED MY PASSION for TEACHING and CONSERVATION

BY DR. SARA ASH Professor of Biology, University of Cumberlands

I was 35 years old and starting my 6th year teaching at a small private university when I became increasingly restless with my career. My teaching load was heavy, leaving little time for scholarship or research, and I was serving as chair of the biology department. There is no doubt that I was languishing and suffering from burnout at my job.

In the spring semester of that year, the Appalachian College Association (ACA), a consortium to which my university belongs, organized a gathering for faculty to meet Jacob Marlin, the co-founder and director of BFREE. He was trying to recruit professors from different schools in the ACA to facilitate a sustained program of travel courses and research. The opportunity to visit a research station in a tropical forest sounded like a dream come true. I applied and was accepted to accompany several other professors on a trip to Belize to learn more about BFREE.

When I left campus on that first trip to BFREE, I was tired, cynical and burned out. I came back refreshed and determined to improve



my knowledge about tropical ecosystems and to offer a conservation course at BFREE for students in our department every two years. I have subsequently taught 4 courses at BFREE, each time working right along with my students to learn more about the natural history of this special place. I knew that the students and I would gain knowledge and

experiences that would change and improve our lives. I have taken over 40 students on this trip since 2008 and most of them have said that the course at BFREE was the highlight of their college careers.

An unexpected product of my experiences at BFREE was how it helped to change my career path. There is just something about living in partial isolation in the middle of an uninhabited jungle that makes you start to reflect on your life and question your choices. Layer on top of that the infectious energy and admirable conservation work taking place at BFREE and it was inevitable that a shift in me would take place. Seeing the dedication of Jacob and others at BFREE made me remember why I chose a career in ecology and conservation and rekindled my fervor for it.

I resigned as department chair upon returning from BFREE with my first group of students. Now my time outside of the classroom is spent mentoring student research in natural history of local organisms and working for regional conservation efforts. For example, I am now a board member of Kentucky Natural Lands Trust, an organization devoted to preserving a 120-mile corridor of Kentucky lands and biodiversity along the crest of Pine Mountain. It will take many years to accomplish our goals but watching the progress of BFREE's projects and conservation work over the past 8 years encourages me to push on. It's strange, but ambling around in the jungles of BFREE corrected the errant trajectory of my career and may, in part, result in the conservation of biodiversity over 1,500 miles away in the mountains of eastern Kentucky.

2014 BFREE Field Courses



New York City College of Technology Architecture Study Abroad in Belize Instructor Lia Dikigoropoulou

Vermont Commons High School Tropical Rainforests Instructors Mark Cline Lucey and Jennifer Cohen

> York University collective Tropical Ecology Instructors Kevin Fraser and Alex Mills

University of Florida Sustainable Development: Law, Policy, and Practice Instructors Tom Ankersen and Lyrissa Lidsky

> Lees McRae College Wildlife Biology Instructor Stewart Skeate

University of Massachusetts, Amherst Tropical Field Biology Instructors Betsy Dumont, Tristram Siedler, Steve McCormick, Adam Porter, and Blake Gilmore

> University of Cumberlands, Kentucky Biology Instructor Sara Ash

> > Lakeland College, Wisconsin Tropical Biology Instructor Paul Pickhardt

Sewanee: University of the South, Tennessee Field Study in Belize Instructors Jon Evans and Jordan Casey

Western Michigan University Tropical Biology Instructors Maarten Vonhof and Michael Buchalski

University of Florida, Center for Latin American Studies and BFREE Teacher's Institute in Belize Instructor Mandy Monroe





BY HEATHER BARRETT Dir. of Organizational Development, BFREE & WILLIAM GARCIA BCARP Coordinator, BFREE

BFREE's Belize Cacao-based Agroforestry Restoration Project (BCARP) is reaching the end of its second year. The project's focus is to expand habitat for over-wintering migratory birds and other wildlife by converting degraded environments such as farmland and secondary growth forest to wildlife friendly habitat with shade-grown organic cacao as the dominant understory. With the addition of five new farmers, each dedicating five acres, BCARP now has over 50 acres of degraded lands being restored into cacao-based agroforestry. More than 20,000 cacao trees have been planted since August 2013.

Working with farmers in Trio Village, a small community of about 1,000 – mostly Mayans and recent immigrants from El Salvador, Guatemala, and Honduras – this innovative project is building capacity and creating new opportunities for farmers to practice sustainable farming methods that create bird-friendly environments, while also generating income and food products for their families. In year one of the five-year plan, BFREE worked with three farmers who committed a total of 27 acres to the project and planted over 10,000 cacao trees. Farmers were offered training, seeds and seedlings, planting materials and equipment, day labor, onsite management during planting events, as well as an innovative approach to payment for environmental services.

As these farmers developed a communal nursery, interest in the project quickly grew. Additional farmers visited the nursery to ask William Garcia, Trio resident and BCARP Coordinator, for information on what was happening and opportunities to participate. In response, Garcia established a waiting list for farmers interested in joining the project. At the end of the first year, five additional farmers committed five acres each to participate in the project.

Through BCARP, a training program was offered in late March 2014 at Trio Government School for participating farmers and community members interested in learning more about BCARP and sustainable farming methods. Topics covered included: choosing good seeds; the process of germination; caring for young and adult trees, common diseases, and organic fertilizers. The one-day training program, led by Kenroy Thomas and Felipe Pop of Belcampo, was well received. When asked about their experience, participants responded enthusiastically. Omar Alfredo Allala, new BCARP member, stated, "When Kenny started talking about organic fertilizer that really got my attention because it is something that I have wanted to learn for a long time." Returning BCARP member, Anacleto Garcia, said "All of

Six backyard nurseries were constructed this sprin, and housed over 12,000 cacao

the information that was delivered was of great help for me. Now I can start applying this to my own farm so I can get a good production. This is a learning process."

During the following weeks, new BCARP farmers, all of whom work full time at other farm locations during the day, devoted their free time in the evenings and on the weekends to building their own nurseries behind their homes. Returning farmers rebuilt their shared nursery to replace planted trees that suffered damage due to disease or other causes during their first dry season in the ground.

Building the nurseries and planting seeds in bags was no small task. Soil had to be collected one shovelful at a time, loaded onto a trailer and then unloaded in the same way at each of the five nurseries. Ten trailer loads were delivered - two to each farmer. This process alone took three full days with additional labor support provided through



BCARP FARMERS

2018.

- Maria Antonia Perez
 - Anacleto Garcia
 - Adelso Garcia Manuel Tut
 - Perdo Cerittos
 - Jovanni Mejia
- Omar Alfredo Allala
- Oscar Valesquez

BCARP. The following days were spent cutting posts, beams, and cohune leaf to build the necessary structure and shade for each nursery.

Once the shade was in place and the soil was delivered, 12,000 cacao seeds were divided among the eight farmers with new farmers receiving the larger quantities. Then it was up to the farmers to fill their planting bags with soil, and germinate and plant their cacao seeds. Families and friends helped

make the process move more quickly. By mid-April, activity around the nurseries had slowed greatly; individual farmers only had to water their seeds, watch for signs of disease or damage due to insects, and wait for the plants to grow.

Planting of the farms begins in September utilizing lessons learned in 2013. The remaining years of the project will focus on continuing care for the trees, harvesting and preparing the seeds for market. Rising interest in BCARP, organic farming methods, and cacao-based agroforestry by those living in Trio and other nearby communities motivates BFREE to consider ways to expand the project in the coming years. At the end of the day, healthy forests make healthy habitat, for animals and people alike. Who would've thought that chocolate could play such an important role in improving the quality of life for both?

Partial funding for BCARP is provided by the U.S Fish and Wildlife Service, on behalf of the Nyanza Natural Resource Damage Trustee Council - comprised of the Service, Commonwealth of Massachusetts and the National Oceanic and Atmospheric Administration.



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BFREE IS MY BACKYARD

BY ORNELLA CADLE Field Course Leader, BFREE

Greetings to all you nature lovers! My name is Ornella Marleni Cadle, better known as "Nelly." I was born on July 31, 1990 in Independence Village. I lived there until I was 6 years old when I moved to Bladen Village with my Grandmother. I graduated from Independence Primary School in 2003, Independence High School in 2007. After a four-year break, I went to Independence Junior College from 2011 to 2013 graduating with honors and an Associate Degree in Tourism Management.

"This year I started working as a Field Course Leader for BFREE and it has inspired me to further my education and become one of the best tour guides in Belize."

When I first moved to Bladen the highway was not paved – it was a dirt road with potholes. There weren't many families living in the area, so there was a lot more flora and fauna. We had no electricity and instead used kerosene lamps and candles. There wasn't much to do with no electricity, so my cousins and I would go to the river to swim on a daily basis. We would also go fishing and do barbeques by the riverside.

Over the years the river has changed a lot; some of the big trees that once lined the river bank are no longer there and some of the sandy bays have been washed away by the floods. Sadly, there aren't as many fish, iguanas and pacas as there used to be because of excessive fishing and hunting.

Bladen is not the only place that has changed over the years. Belize's population has increased significantly and the people have become more modernized. Many people no longer believe in old time medicines and their culture like their ancestors. The people are now trying to keep up with technology and many seem to be forgetting about the importance of their culture. Throughout the years, Belize has grown in some industries such as the banana, citrus and tourism industry. These changes are causing some Belizeans to care more about conserving and protecting our natural heritage.

Growing up in Bladen piqued my interest in the rainforest and its wildlife, because of the abundance of both –

practically in my backyard. Even though I had little knowledge of the rainforest, I still found pleasure in observing it along with its wildlife. Consequently, when my request for an internship at BFREE was approved in 2013, I was excited to get started. During the three weeks that followed I learned quite a lot about my country's natural heritage, which motivated me to learn even more and to educate and encourage others about the importance of conservation.

This year I started working as a Field Course Leader at BFREE. It has inspired me to further my education and become one of the best tour guides and tourism educators in Belize because I've realized that doing what you love and seeing people appreciate your work gives great satisfaction.

Now that I am working at BFREE I have the pleasure of educating and showing off my country's natural heritage to different groups while learning even more myself!

As a child, Nelly and her friends enjoyed the sounds of leaf cutter ants. After finding an active mound, she holds an ant close to a visitor's ear to demonstrate.

Last season, Marlyn Cruz and I took some students on a night hike to the observation tower. We were hoping to see the Great Potoo, a rare owl that regularly perches on top of the tower. We got really lucky that night because not only did we get to hear its call, but we also were able to see it up close. a Cool Spot

The official opening was on March 16, 2014 with the University of Massachusetts, Amherst. Complete with a ribbon-cutting ceremony, snacks, Belikin and sodas, the Cool Spot became an instant success.

BY HEATHER BARRETT Dir. of Organizational Development, BFREE

For years, guests to BFREE have requested a small shop for visitors to purchase drinks, snacks, and souvenirs while at the field station. Over time, BFREE has sold things in earnest – primarily when the Marlin kids (Sofia, Shaman and Hyla) have been around and interested in making a few extra bucks. They've sold everything from candy bars and Coca-Colas that their dad bought in town and transported back into the bush to mangoes and other garden fruits they picked that morning from the orchard. However, the desire for an established place to buy things at BFREE has persisted.

In response, BFREE secured the help of University of Florida professor Dr. Lori Pennington-Gray to help develop a store concept at the field station. She enlisted her undergraduate class, Entrepreneurial Recreation & Tourism, to brainstorm what BFREE's store could look like and how it could operate. In Belize, a "Cool Spot" is a shanty type building on the side of the road where a passerby can stop to buy a cool drink and a snack. The Cool Spot idea was used as a jumping off point when first describing the project to the class early in the fall 2013 semester.

The students were divided into thirteen groups of five and were challenged to run with the idea. Guided by Dr. Pennington-Gray, groups developed inventory lists, investigated green sources for purchasing items, designed the facility, created marketing plans, and considered how to operate an online store within the BFREE website as well. At the end of the semester, groups presented their recommendations to US for BFREE staff. Practical advice included methods for managing money and inventory with samples of budget sheets and schedules, while creative ideas featured themed nights with games and entertainment, fun foods and beverages and even a life-sized Jenga game!

In January 2014, architecture students from New York City College of Technology (NYCCT) came to BFREE to participate in a field course. This course, led by professor Lia Dikigoropoulou (NYCCT) and Jacob Marlin, challenged students to advance their understanding of architecture by investigating the unique structures at the field station. The students were tasked with completing architectural renderings of some facilities onsite including the composting bathrooms, the solar system, and the Hicatee Conservation and Research Center.

Using the UF students' recommendations to get started, NY-CCT's next big assignment was to Marcelino led the team of students in their day and a half construction effort, and though amazing progress was made, there wasn't enough time to finish the structure. After NYCCT's departure, BFREE staff, Marcelino and Fernandes Sho, completed construction.

In the months that followed, Jacob and Shaman Marlin researched and selected items to add to the Cool Spot inventory, so that more than just snacks and drinks could be available for purchase. Chelsea Hetelson simplified the logo design for use on the various items and the

Funds raised at the Cool Spot will benefit research projects and environmental outreach programs at BFREE.

design the new Cool Spot at the old BFREE schoolhouse. Each of five students designed their ideal spot, presented their concept and received feedback. Ultimately, the class combined their ideas with those of Lia, Jacob, Marcelino Pop and others at BFREE to finalize a design. The next day, construction began with materials left over from various projects onsite and also wood donated by the Gomez and Sons Sawmill. orders were placed. Now when you visit the rainforest, you can take home BFREE memorabilia such as pens, baseball caps, t-shirts, BPA free water bottles, and more!

An on-line store is in the works – check www.bfreebz.org this fall for more info!



INTERNATIONAL PEN PALS

This spring, Standard 3 students in Golden Stream Village, Belize sent letters filled with drawings, questions and personal facts to a group of third-graders in the northeastern United States! Using the theme of migrating birds, staff from BFREE and the US Fish and Wildlife Service partnered to create the connection between Ms. Michelle Alvarez's class at Golden Stream Community School just south of BFREE and Ms. Kimberly Brigg's class at Canterbury Elementary School in Canterbury, New Hampshire.

Two letter exchanges occurred between January and June – this was no easy feat since there is no post office in Golden Stream nor within 30 miles in any direction! Letters from Belize were hand-carried on international flights by U.S. for BFREE staff and visitors and then mailed to New Hampshire. Students from both countries loved the exchange and plan to continue their pen pal relationships during the 2014-15 school year.





A Q&A with Ms. Michelle Alvarez of Golden Stream School

BY CHELSEA HETELSON Program Assistant, BFREE

Chelsea: Why did you think having pen pals from the U.S. would be a good opportunity for your students?

Michelle: When BFREE and US Fish and Wildlife staff came to visit last year, I was teaching my students about letter writing and I realized this would be good practice for them. Also, I believed the exposure to birding and the cultures of other students would be beneficial for them.

Chelsea: How do the letters get delivered? **Michelle:** Ms. Heather took the letters from my students and brought the replies back.

Chelsea: What are the things you hope your students learn from this project?

Michelle: Since my students are second language learners (dialects of Maya are their first language), I hope that my students learn to express themselves in English and also learn to appreciate other people and animals - both near and far.

Chelsea: How have the birds that both

classes share become a part of the conversation?

Michelle: My students started by introducing themselves and then they stated information about animals they found around them.

Chelsea: Will the same kids continue to communicate as they grow older? **Michelle:** Yes, we would hope that the students continue to communicate as they get older and also hope that other students join the project.

Chelsea: Have you been a part of a pen pal program before with your class? **Michelle:** No, never.

Chelsea: What has been most enjoyable for you about this project?

Michelle: I enjoyed seeing the excitement in the students' faces and watching them reading their letters – pronouncing words properly – and sharing letters with each other.

For more pictures of the classrooms and of the students' letters, visit the BFREE Jungle Blog at bfreebz.org.

BFREE is Proud to Work with These Partners in Conservation

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Financial Report 2013 – Present



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We are grateful for both the financial and in-kind donations received from summer 2013 to summer 2014.

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Please let us know of any omissions or errors on this list.



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March of 2014 brought great joy to the conservation community. A team of BFREE biologists ventured deep into the Bladen Nature Reserve to determine the status of a juvenile Harpy Eagle last seen in May, 2013. As this picture illustrates, the Harpy Eagle, at approximately a year and a half was doing exceptionally well. The raptor was observed perched on the same tree that houses its nest and was viewed over a three hour period just before dusk. This is the third confirmed juvenile wild Harpy Eagle in Belize since 2005.