

University of Belize

**ENVIRONMENTAL
RESEARCH
INSTITUTE**

**ANNUAL REPORT
AUGUST 2010 - JULY 2011**

University of Belize





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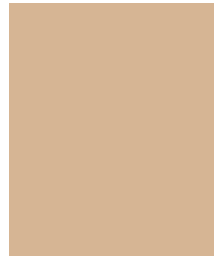
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Acronyms



ADEKUS	Anton de Kom University of Suriname
AGRRA	Atlantic and Gulf Rapid Reef Assessment
APAMO	Association of Protected Area Management Organizations
BAS	Belize Audubon Society
BBG	Belize Botanic Garden
BFREE	Belize Foundation for Research and Environmental Education
BTFS	Belize Tropical Forest Studies
CBC	Central Belize Corridor
CATHALAC	Water Center for the Humid Tropics of Latin America and the Caribbean
CBWS	Cockscomb Basin Wildlife Sanctuary
CCFS	Calabash Caye Field Station
CORAL	Coral Reef Alliance
CPAMT	Center for Protected Areas Management Training
CSU	Colorado State University
CSUCA	Superior Council of Central American Universities
EEP	Energy and Environment Program
ERI	Environmental Research Institute
ERI-SC	ERI Steering Committee
EU	European Union
FD	Forest Department
FST	Faculty of Science and Technology
GEF	Global Environmental Facility

ICT	Information and Communication Technology
KRAs	Key Result Areas
LAMP	Long-term Atoll Monitoring Protocol
LCRS	Las Cuevas Research Station
LIC	Land Information Center
MAR	Mesoamerican Reef
MBRS	Mesoamerican Barrier Reef System
MNRE	Ministry of Natural Resources and the Environment
NGO	Non Governmental Organization
NHCMN	National Hicatee Conservation and Monitoring Network
NPAS	National Protected Areas Secretariat
NPASP	National Protected Areas System Plan (NPASP)
NPATC	National Protected Areas Technical Committee
NRM	Natural Resources Management
NRMP	NRM program
PACT	Protected Areas Conservation Trust
RBGE	Royal Botanic Garden Edinburgh
SACD	Sarteneja Alliance for Conservation and Development
SEA	Southern Environmental Association
SICA	Sistema de Integración Centroamericana
SIDA	Swedish International Development Agency
SPAG	Spawning Aggregation
TASC	Turneffe Atoll Sustainability Council
TIDE	Toledo Institute for Development and Environment
TNC	The Nature Conservancy

TSA	Turtle Survival Alliance
UB	University of Belize
UG	University of Guyana
UNDP	United Nations Development Programme
UoE	University of Edinburgh
UK	United Kingdom
UWI	University of the West Indies
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund
Ya'axché	Ya'axché Conservation Trust



Acknowledgements

The ERI would like to thank all partner organizations and individuals who contributed to the Institute's work during the academic year. We would like to especially acknowledge the Oak Foundation, Panthera and the UK Government's Darwin Initiative for their tremendous support. In addition we have many other donor and partner institutions we wish to thank: WWF, WCS, the Oceanic Society, TNC, Seagrass Net, TSA, SIDA through the CSUCA project, the EU through its EDULINK program, PACT through its Environmental Fellowship Award Program, NPAS, FD, TIDE, SEA, SACD, BAS and all the organizations and individuals who are members of the various networks we coordinate or are active in. This year we especially acknowledge our partnerships with the Ya'axché Conservation Trust and the Fisheries Department. We also thank Dr. Bruce Miller for the equipment and literature contributions to the Institute. We thank our main project partners in the UK: UoE, the University of Southampton and the RBGE, our Caribbean partner universities: UWI-St. Augustine and Mona, University of Guyana, ADEKUS, the College of the Bahamas, and the regional CSUCA.

We are grateful to the ERI-SC for providing oversight for our operations and programs during this last academic year and thank them, the University Administration and the UB Board of Trustees for having confidence in our work. We thank the offices and departments at UB, which have provided constant support for our work. We especially thank the Office of the Provost, Office of the Assistant Provost, Admissions Office, the Office of Finance, the Science Department, the Physical Plant Department, the Accounts Department, the ICT Department, the Department of Public Safety and the Office of Public Information. We also thank all the volunteers who worked with us this year in the Central Belize Corridor or doing marine monitoring, especially our UB student volunteers who work with us in the Turneffe Atoll. We especially acknowledge the contributions of our UK volunteer Aysha Hamisi, who developed the ERI Publications Repository; the contributions of the UB Dean of Students, Mr. William Neal, and UB student, Dalhart McFadzean, in preparing the layout for this annual report; and ERI's Publications Assistant, Denver Cayetano, who completed the final formatting and layout.

Mission

The Environmental Research Institute continuously builds national scientific capacity for the effective management, sustainable use and conservation of Belize's natural resources.



<http://www.eriub.org>

Vision

As the premiere environmental research institute in Belize and highly respected in the region, ERI provides sound science and creates a culture of evidence-based decision-making in the public and private sector in areas relevant to Belize's sustainable development.

President's Message



Dear Partners and Colleagues,

As the new President of the University of Belize, I have been impressed by the level of commitment that has been displayed by the members of the ERI in their efforts to establish a program that is rooted in the exploration, monitoring, and improvement of the marine and terrestrial environments of Belize. The ERI's activities have implications for the wider region of the Caribbean and Central America in terms of scholarly research, public education and policy formulation. In effect, the ERI is an evolving model that will help to shape the future of the University of Belize as a research and teaching institution which will both influence national and regional policies and train leaders for the future.

The 2010-2011 academic year has been a period of continued growth capped by the collaboration among regional universities through the establishment of the Master's program in Biodiversity Conservation and Sustainable Development. Again, this regional initiative offers a way forward for the promotion and development of comparative research that will help to shape more sophisticated policy analyses and prescriptions at a time that the region is facing the need to formulate policies on climate change and its attendant consequences.

In effect, the ERI is helping us to understand the present and plan for the future. It is an initiative that will make the University of Belize a critical player in regional debates and expand the influence of evidence-based decision making processes across the Caribbean and Central America.

Sincerely,

A handwritten signature in dark ink, reading "Cary Fraser". The signature is fluid and cursive, with the first name "Cary" and last name "Fraser" clearly distinguishable.

Dr. Cary Fraser

From the Administrative Director



Dear Partners and Colleagues,

I am pleased to share with you the second annual report for the ERI. The 2010-2011 academic year was a year of tremendous growth. We engaged our staff and Steering Committee in a strategic planning process, a review of our existing policies and procedures manual and the formulation of a business plan for the unit. Along with the production of the National Environmental and Natural Resources Management Research Agenda, developed in collaboration with stakeholders, these strategic and planning products set the foundation for our work and will guide our direction for at least the next five years.

In terms of our programmatic work the accomplishments are several. On the marine front, through our *Research and Monitoring* program, we designed and implemented a monitoring program for the Turneffe Atoll. This work culminated in the production of a Status of Ecosystems Report for Turneffe, which is being used to inform the development of a management plan for the Atoll. On the terrestrial front, our wildlife work in the Central Belize Corridor is also being used to inform the planning work and decision-making process for securing this critical area connecting the northern block of protected areas to the Maya Mountains. In addition, as part of our *Training and Fellowships* program we provided training opportunities to more than 40 UB undergraduates and over 20 NRM professionals. We also spearheaded the development of the first graduate degree program for UB, a regional Master of Science (M.Sc.) in Biodiversity Conservation and Sustainable Development, which is being offered in collaboration with three other Caribbean partner universities. Finally, our biggest accomplishment through our *Communication and Outreach* program was the development and strengthening of many national and international partnerships, especially those that enabled us to work via networks.

It is with the power of collaborative work in mind that I close by thanking all of you who have made the work of the ERI possible thus far. I especially thank our Steering Committee, the University Administration and the UB Board of Trustees for having confidence in our work and efforts. Last but not least, I thank our extremely enthusiastic staff for all the on-the-ground work that made the academic year a success.

Sincerely,

A handwritten signature in black ink, which appears to read "Elma Kay". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Dr. Elma Kay

Introduction

The ERI completed its second year of operations in the 2010-2011 academic year, which ran from August 2010 to July 2011. During this year we had a fully operational Steering Committee (ERI-SC) and 15 fulltime staff members in Belmopan and at the Calabash Caye Field Station (CCFS), Turneffe Atoll, which we manage. The majority of this fulltime staff has been with us since our official launch in January 2010. In addition to full time staff, during 2010-2011 we also had a variety of part-time staff and volunteers working at the CCFS, the Central Belize Corridor (CBC) area and other field sites, as well as at the office located on the University of Belize (UB) Pre-school grounds in Belmopan. The majority of our part-time employees consisted of student assistants, recent graduates of UB academic programs and people from communities bordering or near our field sites.

During the academic year, we refined our administrative processes and defined our strategic directions, while continuing the implementation of our three programs: *Research and Monitoring*, *Training and Fellowships* and *Communications and Outreach*. We derived vast support for our programmatic work during the year through seven local and regional projects for which we directly received funding, as well as from participation in several other initiatives that helped to build the Institute's capacity and which provided resources for our work. During the 2010-2011 academic year we directly managed a total of BZ\$1,255,132.26 in project/donor funds with oversight from the Provost's Office and the Finance Office. In addition, we were responsible for the management of the recurrent operational expenses of the CCFS covered by a University allocation of BZ\$287,459. This allocation was managed through the University's central accounting system.



Operations and Administration

The 2010-2011 academic year was an exciting and busy year for us. In December 2010, we completed a strategic plan for the Institute through a process that involved the input and effort of both the ERI-SC as well as ERI staff members. Our 2010-2015 Strategic Plan is fully consistent with, and advances the University's broader strategic plan that focuses on: *Achieving Academic Excellence, Building a Learner-Centered Network, Contributing to National and Local Development and Improving Governance and Management*. The ERI Strategic Plan focuses on four Key Result Areas (KRAs): *Institutional Strengthening and Sustainability, Capacity Building, Research and Monitoring and Communication and Outreach*, which closely match our ERI programs. Each KRA has multiple strategies (Table 1) and full implementation of these is now underway.

Another major accomplishment for us was the completion of a draft Operational Policies & Procedures Manual, which was presented to the ERI-SC at its July 2011 meeting. We are now in the process of incorporating the committee's recommendations before the manual is presented to the UB Board of Trustees (UB-BoT) for final approval. We have shared the draft manual with the University's Academic Council and various other University Departments for their use and feedback.

Finally, we were also able to make significant progress in developing a business plan for the ERI and the CCFS. A draft 2011-2021 ERI and CCFS business plan was completed by the end of the academic year. The draft business plan details our expenditures and projected revenue streams and the major strategies and actions for the development of the Institute. Along with the strategic plan, the business plan will further guide our ERI and CCFS operations increasing program capacity over the next few years.



Aerial photo of the Calabash Caye Field Station

Table 1: Key results area and Strategies in the ERI 2010-2011 Strategic Plan

Key Result Area					
Institutional Strengthening and Sustainability	Capacity Building		Research & Monitoring	Communication and Outreach	
Strategies					
Improving Governance	Enhancing Quality of Education at UB		Focusing Research and Monitoring Efforts	Instituting Effective Communications and Outreach	
Increasing Revenue and Support	Increasing Natural Resources Management Capacity in Belize		Instituting Effective Information Management	Supporting National Strategies and Plans	NRM
Developing Human Resources	Conducting Quality Research and Training through Fellowships				
Enhancing Human Resources Management					
Improving Financial Management					

Steering committee

A major part of our administration occurs through guidance and oversight by a specially appointed ERI-SC. The committee is comprised of members from the University, the private sector and both governmental agencies and non-governmental organizations (NGOs) responsible for natural resources management and/or involved in conservation and environmental work. Table 2 lists the individuals who served in the ERI-SC during the academic year. We held three regular meetings of the committee in November 2010, March 2011 and July 2011 to review progress and financial reports and provide guidance on ERI programs. We also held a special meeting in September 2010 as part of our strategic planning process.



Table 2: Composition of the ERI-SC in 2010-2011 academic year

Name	Description of position represented on ERI-SC	Organization
Ismael Hoare, Ph.D.	UB Provost - ERI-SC Chairperson	UB
Sandra Miranda	UB Director of Finance	UB
Elma Kay, Ph.D.	ERI Administrative Director – <i>ex-officio</i> member	UB
Alexander Bowen	Private Sector Representative – Elected Vice Chairperson	Gallon Jug Agroindustry
*Rachel Miller	Private Sector Representative	Marine Farms Ltd.
Beverly Wade	Fisheries Administrator	Fisheries Department
James Azueta	Alternate for Fisheries Administrator	Fisheries Department
Wilber Sabido	Chief Forest Officer	Forest Department (FD)
Rasheda Garcia	Alternate for Chief Forest Officer	FD
Celia Mahung	Executive Director of an organization representing the Association of Protected Area Management Organizations (APAMO)	Toledo Institute for Development and Environment (TIDE)
James Foley	Alternate for Executive Director of (APAMO)	TIDE
Nadia Bood	International Environmental NGO Representative	World Wildlife Fund (WWF)
Mauricio Mejía	Alternate for the International Environmental NGO Representative	WWF

*Served part of the year

Staff

During the 2010-2011 academic year, we had 15 full time staff located in Belmopan and the CCFS. In addition to the full-time staff members, our work was also supported by eight part-time staff, one at the CCFS, three who worked as part of the wildlife team and four student assistants who worked at the office and as part of our marine team. In addition, we benefited greatly from the assistance of several volunteers especially for our wildlife and marine work. Aysha Hamisi, a volunteer from the United Kingdom (UK), developed the Publications Repository over a 5-month period. Table 3 lists ERI staff during the academic year.



ERI Staff in Belmopan

Table 3: Staff of the ERI during the 2010-2011 academic year. Staff are full-time unless otherwise indicated.

Name	Position	Date of Inception	Organization funding salary
Elma Kay, Ph.D.	Administrative Director & Science Director (Terrestrial)	1-Sep-09	UB
Leandra Cho-Ricketts, Ph.D.	Science Director (Marine)	1-Sep-09	UB
Ian Sangster	Administrative/Financial Manager	1-Feb-10	UB
Julissa Bardalez	Administrative Assistant	1-Dec-09	UB
Kenneth Gale	Station Manager, CCFS	1-Feb-09	UB
Teresa Catzim	Head Cook, CCFS	Prior to 2009	UB
Inacio Cortez	Caretaker, CCFS	Prior to 2009	UB
Albert Cherrington Jr.	Boat Captain, CCFS	Prior to 2009	UB
Margarita Hernandez	Assistant Cook	22-Apr-11	UB
*Irma Leiva	Relief Cook	1-June-11	UB
Bart Harmsen, Ph.D.	Panthera Jaguar Research Fellow in Wildlife Conservation	1-Feb-10	Panthera
*Marvin Vasquez	Field Assistant	15-Apr-11	Panthera
Celso Cawich	Marine Biologist	1-Feb-10	Oak Foundation
Camilo Chirino	Database Administrator	1-Apr-10	Oak foundation
∞Jani Salazar	Database/Research Assistant	1-Oct-10	Oak Foundation
∞Monique Woodeye	Research Database Assistant	1-Oct-10	Oak Foundation
∞Raven Clarke	Publications Assistant	1-Oct-10	Oak Foundation
∞Tanya Barona	Field Research Assistant	1-Oct-10	Oak Foundation
German Lopez	Darwin Botanist	1-Feb-10	Darwin Initiative
Said Gutierrez	Darwin Wildlife Biologist	1-Feb-10	Darwin Initiative
Arturo Ramos	Field Operations Manager	1-Apr-10	Darwin Initiative/ Panthera
*Michael Brakeman	Field Assistant – Darwin Large Mammal Corridor Project	1-Feb-11	Darwin Initiative/ Panthera
*Christopher Estrada	Field Assistant – Darwin Large Mammal Corridor Project	1-Feb-11	Darwin Initiative/ Panthera

- Part-time positions
- ∞ Student positions

Major Projects and Collaborations

The ERI continued working on the development of programs and operations through several funded projects, grants and donations. We received funds that we directly executed from seven different donors and partners. We were also a partner in and beneficiary of several projects for which we did not receive direct funding. Below is a brief description of the four major projects and/or collaborations that we implemented/ worked on during the academic year. More details on results obtained through all of our projects and collaborations are presented under the **Programs** section of this report starting on page 17.

Oak Project

The ultimate goal of the 5-year Oak Foundation-funded project *Developing National Research and Monitoring Capacity for the Management of Belize's Marine Protected Areas and Natural Resources* is to develop a research and capacity-building mechanism within the national university to enable a sustained program of scientific research and training of students and professionals who will contribute significantly to the management of Belize's protected areas and natural resources. This project has been crucial to the development of our programs, particularly our marine research and monitoring, as well as our administrative processes and operations. In this academic year, we successfully completed year 1 of the Oak funded project. Through this project, we produced the 5-year National Environmental and Natural Resources Management (NRM) Research Agenda with input from non-governmental organizations (NGOs), government agencies, researchers and co-managers working within Belize. The Agenda is meant to guide the research programs of the ERI and we will coordinate its implementation through local and international partnerships. The Agenda can be accessed at http://www.eriub.org/index.php?option=com_docman&task=cat_view&gid=50&Itemid=99. A second major output under this project was the development of an online research Publications Repository. Our Publications Database Student Assistant is currently refining and populating this repository with research papers and reports. The Publications Repository can be accessed at http://www.eriub.org/index.php?Itemid=100&option=com_wrapper&view=wrapper. Apart from the ERI Publications Database Student Assistant, we hired three other student assistants through the Oak Project during the academic year.

Panthera Collaboration

The ERI-Panthera collaboration has been key to the development of our wildlife research and monitoring work. The main goal of the collaboration is for Panthera and ERI to work together on improving understanding of wildlife for its effective conservation, in particular that of wild felids such as the jaguar. The jaguar is considered an important indicator of ecological health and the maintenance of jaguar populations and connectivity between them is a key focus of the collaboration. During the academic year Panthera matched resources provided by the Darwin Initiative for wildlife research and monitoring within the CBC. Panthera support also enabled us to once again hire our Panthera Jaguar Research Fellow in Wildlife Conservation, Dr. Bart Harmsen. In addition, through the Panthera collaboration and in conjunction with the Belize Audubon Society (BAS), we were able to conduct a jaguar population survey in the Cockscomb Basin Wildlife Sanctuary (CBWS) this year. The CBWS is one of the sites with the longest record of monitoring data for jaguar populations in the country and the region. Finally, we were also able to host various Belizean and foreign volunteers and interns, as well as hire local field assistants to work on wildlife research through this collaboration.

Darwin Large Mammal Corridor Project

The 3-year *Belize Large Mammal Corridor Project* funded by the Darwin Initiative reflects a collaborative effort amongst the ERI, Southampton University, Panthera, and the Belize Forest Department (FD). Its main objectives are: planning a workable natural corridor – the CBC, to connect the northern block of protected areas that includes the Rio Bravo, with the Southern block comprised of the Maya Mountains; incorporating the corridor into the framework of existing protected areas and zoning plans; establishing an in-country tradition of training for Belizeans to study their own wildlife; and institutionalizing the wildlife research tradition within the ERI. We completed year 2 of this project during the academic year. Despite setbacks from Hurricane Richard in October 2010 and subsequent forest fires in the corridor, we continued live trapping and telemetry of mammals in the CBC, we repeated jaguar surveys to compare pre- and post-hurricane data and we trained several Belizean and foreign volunteers and interns in mammal handling and radio-tracking through the project. In addition, in April 2011, through the efforts of this project, the National Protected Areas Technical Committee (NPATC) recommended the inclusion of our work in the CBC into the operational framework for the implementation of the National Protected Areas System Plan (NPASP) as a priority.

Darwin Lowland Savannah Project

The 3-year *Conservation of the Lowland Savanna Ecosystem of Belize* project funded by the Darwin Initiative reflects a collaborative effort amongst many institutions including the University of Edinburgh (UoE), Royal Botanic Garden Edinburgh (RBGE), the ERI as the main in-country partner, FD, the Belize Botanic Garden (BBG) and Belize Tropical Forest Studies (BTFS). Its main purpose is to increase available data and enhance the capacity of local institutions to undertake taxonomic research and mapping required to identify priority areas for conservation within savannas. We completed year 2 of this project during the 2010-2011 academic year. As part of this project, our Darwin Botanist received advanced plant taxonomic and curatorial training in order to lead the effort to completely re-curate the Belize National Herbarium located at FD. We also produced a database for the plant specimens in the herbarium as well as easy to use botanical savanna field guides for students and the general public. Through the project, an updated map of the lowland savannas of Belize, which will be integrated into the country's ecosystems map, has also been developed. A full project website at <http://www.eeo.ed.ac.uk/sea-belize> describes the project and partners and makes project outputs easily accessible.



Programs



In 2010-2011 we worked on accomplishing our main objectives and mission, and reaching towards our vision, through the development and implementation of our three programs: *Research and Monitoring*, *Training and Fellowships* and *Communication and Outreach*.

Our *Research and Monitoring Program* focuses on the implementation of research and monitoring relevant to the sound management of Belize's natural resources in four main areas, namely: inventory and assessments, resource monitoring, research and monitoring on species of concern and research on ecosystems within both natural and human-dominated landscapes/seascapes.

The *Training and Fellowships Program* is our capacity-building program. It involves the design and implementation of training opportunities aimed at meeting the needs of professionals in the field of NRM and working on and/or with new and existing university academic programs to strengthen the quality of education provided to students through hands-on research and experience. Fellowships for resident lecturers and visiting researchers are also part of this program as a way of enriching the academic programs at the University and enhancing our research capacity.

Our third program is *Communication and Outreach*, which is aimed at mainstreaming the results of our work in order to influence decisions made for the management of the country's natural resources. One of the main components of this program is the translation of research data into user-friendly formats for use by key decision makers involved in the creation of policy and legislation, and the management of natural resources, as well as for use by students, the private sector and public at large. In addition, through this program, we produce, disseminate and update key national reports and programs, including the National Environmental and NRM Research Agenda, and actively participate in relevant national programs, initiatives and committees.

Research and Monitoring

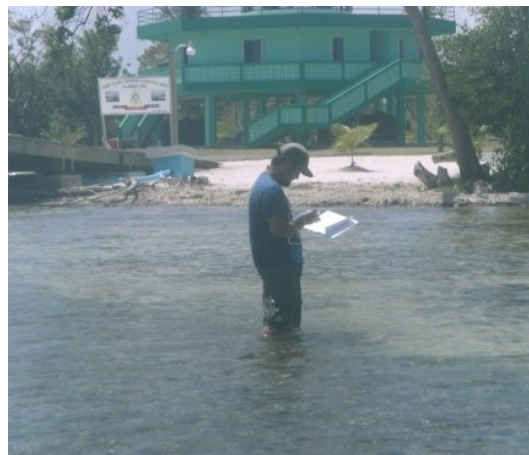
The ERI worked on implementing its *Research and Monitoring Program* with support from the University and various funded projects. The following subsections detail our research and monitoring activities for 2010-2011.

Marine Monitoring and Research

We continued our monitoring at various marine sites during the 2010-2011 academic year, with support from the Oak Project and Sea grass Net, University of New Hampshire. Our monitoring efforts for the year included annual monitoring of ecosystems and sites under the monitoring program developed in 2010 for the Turneffe Atoll. Our Marine Biologist with the help of ten UB student volunteers led the field effort. We produced a report on the status of marine ecosystems at Turneffe based on the 2010 monitoring efforts and this is now available through our website.

Seagrass Net

We conducted Seagrass Net monitoring activities in October 2010, January 2011, April 2011 and July 2011 with the support of a small sub-grant from University of New Hampshire for Seagrass Net activities. We submitted all data to the online database and sent samples to the New Hampshire Wet Laboratory. During this year, we replaced two anchor pins used to demarcate the permanent transects and two underwater temperature loggers that were lost during Hurricane Richard.



Seagrass field data collection

Ecosystem Monitoring

We completed the 2010 Turneffe Atoll MBRS synoptic monitoring report and this is now available on our website. The report gives an update on the health of Turneffe's reefs using the Healthy Reef's Eco Report Card indicators. The report also describes the mangroves and sea grass ecosystems based on the permanently established sites. These results are being incorporated into the management planning effort for the Turneffe Atoll being carried out by the Turneffe Atoll Sustainability Council (TASC), of which ERI/UB is a member. During the months of July and August we conducted the 2011 annual MBRS monitoring with the assistance of one personnel from the NRM Program and eight student volunteers.



Student volunteer conducting reef monitoring

ERI Marine Volunteers

We recruited seven new student volunteers at the beginning of summer 2011. These volunteers are all UB students, from both Associate and the Bachelor degree programs. During June 2011 the seven students underwent a five-day field training session at the Calabash Caye Field Station. Upon completion of training, the students were able to identify over 95% of the coral and reef fish species included in the Atlantic Gulf Rapid Reef Assessment (AGRR) Monitoring Protocol training. The volunteers were also introduced to regional monitoring protocols such as the Seagrass Net and the Long-term Atoll Monitoring Protocol (LAMP).



2011 student volunteer training session at the CCFS



Student volunteers receiving training in mangrove monitoring

Sea Turtle Nesting Monitoring

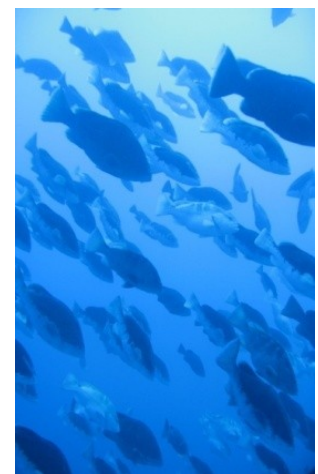
We established a sea turtle nesting monitoring program for Calabash Caye in conjunction with the Belize Sea Turtle Conservation Network. We implemented the monitoring program in the month of June-July 2011 with the assistance of two student interns from UB. The program ran for six weeks, during the peak period for sea turtle nesting activities. No nesting activity was observed at Calabash Caye but the students collected beach data that will be used to characterize the Calabash Caye beach and serve as a baseline to track changes overtime, particularly in relation to storm damage.



Student interns learning how to excavate a turtle nest

SPAG Sites

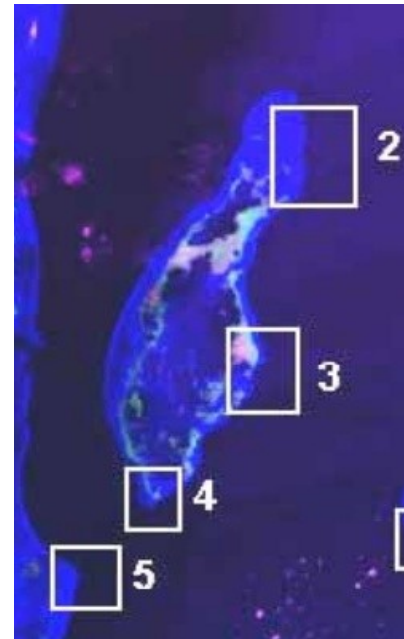
In January 2011 we visited six historical fish Spawning Aggregation (SPAG) sites in the Turneffe Atoll. The last time these sites were monitored was in 2004. The aim of our visits was to determine if the sites were still active SPAG sites. Another objective was to conduct SPAG monitoring training. Out of the six sites we visited only two were identified as active, one was a multi species site and the other a Dog Snapper/multi-species site. We identified four sites as inactive, but will continue to monitor these as fish may have periodic site fidelity. We noted that the SPAG Marine Reserve - Dog Flea, was inactive. This monitoring was conducted with the assistance of Eduardo Barrientos from the NRM Program, two ERI student volunteers, Eliceo Cobb from the Belize Audubon Society and Valentine Rosado from the Coral Reef Alliance (CORAL).



Nassau grouper spawning aggregation at Lighthouse Reef



Turneffe Atoll January 2011 SPAG Team



Turneffe Atoll SPAG Sites

Marine Databases

ERI successfully developed and hosted the National Coral Bleaching Database, which supports the work of the National Coral Reef Monitoring Network. We designed this online database to collect and house the coral bleaching monitoring data and to provide summary results of the data to the network's members. We revised and improved the database after a preliminary testing period and the report generation interface is now being tested. We also developed a front end interface for the National SPAG Database, previously hosted by The Nature Conservancy (TNC) out of Guatemala. We are now the database manager and will host this database locally. We will complete the fully revised SPAG database for use in December 2011 at the start of the next SPAG season.

Marine Research

We were also involved in a few other research and monitoring efforts during the 2010-2011 academic year. These include:

- Dr. Cho-Ricketts and five UB student volunteers conducted *Diadema* population studies at Glover's Reef Atoll in May 2011. This effort is in collaboration with the Wildlife Conservation Society (WCS) and has been ongoing since 2007. The urchin's populations are low but constant, indicating a sustained population within Glover's Reef. We submitted a research report to WCS highlighting the findings of the surveys along with recommendations for future monitoring.



Diadema's survey team, Middle Caye
Glovers Reef

- Through a sub-grant from WWF, we conducted a mangrove ground-truthing study in partnership with Wildtracks, the Sarteneja Alliance for Conservation and Development (SACD), Southern Environmental Association (SEA) and TIDE. The objective of the study was to ground-truth the 2010 Mangrove Habitat Map developed by Emil Cherrington of CATHALAC. The study surveyed a total of 50 non-mangrove sites and 63 mangrove sites at five different locations: Corozal Bay, Turneffe Atoll, Belize City/Drowned Cayes, Placencia and Port Honduras. Two of our marine staff along with 5 student volunteers conducted ground-truthing for Turneffe and Belize City/Drowned Cayes locations, while a team from SACD and Wildtracks did the ground-truthing for Corozal Bay. Teams from SEA and TIDE did the ground truthing work for Placencia and Port Honduras respectively. The results showed that the mangrove habitat map developed using remote sensing imagery was 90.9% accurate.

Terrestrial Monitoring and Research

Most of the ERI's wildlife research has thus far focused in the Central Belize Corridor (CBC) area. However, through the Panthera Collaboration and in conjunction with BAS we were able to expand our wildlife research to conduct a camera survey for jaguars in the CBWS. In addition, through the Darwin Savanna Project we were also engaged in botanical research during the 2010-2011 academic year.

Wildlife Research and Monitoring

This year was a challenging one for our corridor work being done through the Large Mammal Corridor Project funded by the Darwin Initiative and the Panthera Collaboration. The CBC first experienced a natural disaster and then extensive forest fires that were largely human-induced. Despite these setbacks, our wildlife team was able to conduct live trapping and radio-tracking of several mammals including pacas, coatis, foxes, tayras and kinkajous as well as repeat camera surveys post-Hurricane Richard to assess the hurricane's impact on the abundance and activity of jaguars and other wildlife.

Hurricane Richard & Forest Fires

In October 2010, the CBC was hit by Hurricane Richard, and suffered extensive damage. Many mature trees were broken or uprooted, with severe consequences for wildlife in the area, and our ability to conduct field research. All trails and survey grids had to be re-opened. Where a machete was previously enough, the field crew needed chainsaws to clear trails of fallen trees. Howler monkeys and kinkajous, both canopy dwellers, were forced to search for food on the ground. Many displaced curassows, forest birds, walking on the roads were observed; and soon our wildlife team started receiving reports of their widespread opportunistic hunting.

In April 2011, forest fires spread throughout the corridor, as a result of people burning vegetation in savannas and along forest trails. The drought combined with the high fuel load of dead wood in the forest meant that fires could spread through the area. The uncontrolled fires affected approximately half of the corridor. This meant that an already dire situation for fruit and seed-eaters became even worse.

Live trapping and telemetry

Live trapping and attachment of radio collars on mammals is needed in order to understand their patterns of movement within the CBC. Many animals were food deprived during the dry season following the hurricane and were readily attracted to baited live cage traps allowing easier capture. We only processed individuals that were in good condition to allow the use of anesthetic and wearing of collars; for animals to be collared, the collar had to be less than three percent of their body weight.



Dr. Bart Harmsen of ERI fastening a collar on a coati



Paca ready to be collared

Kinkajous –We captured at least eight kinkajous (two females, six males). Initially we fitted them with tiny radio collars and followed them by telemetry. However we soon discovered that they groom one another, and in doing so, chew the antennae from the collars. As the kinkajous often returned to the traps in search of food, we quickly discovered and removed damaged collars.

Coatis –We captured and collared four coatis (two males and two females). One male was probably killed by a dog on a Cashew Farm and the collar was tracked to the farm house.

Pacas – We captured and collared five pacas (two females and three males) adding to those collared last year. We successfully re-trapped two of the pacas from last year and removed their collars due to low batteries.

Grey Foxes – We captured and collared three grey foxes (one female and two males).

Tayra – We captured and collared a single female tayra. Very little is known about tayras in the wild as they are so difficult to capture.

Our team is gaining valuable insight into how these different mammals are using the human-influenced landscape of the CBC, and how they are surviving in an area hit by hurricane and forest fires.



Dr. Rebecca Foster of Panthera with coati on table



Said Gutierrez, ERI Wildlife Biologist checking coati before release



Tayra on table



Dr. Bart Harmsen checking Tayra before release

Camera trapping

In addition to live trapping, we ran large-scale camera surveys ($\sim 350 \text{ km}^2$) within the corridor primarily to monitor the jaguar population. This year two of the three surveys from 2009/2010 were repeated to assess the impact of Hurricane Richard on the abundance and activity of jaguars and other wildlife. This was a major task, requiring our field crew to re-open trails and roads covered with fallen trees and debris from the hurricane.

Runaway Creek & Peccary Hills National Park Camera Survey -- Jaguar activity was higher post-Hurricane Richard than in 2009. This may be because the few roads and trails, which were re-opened, represented a limited resource, and therefore became key access paths through the heavily damaged jungle. Most likely, jaguars and other wildlife eagerly used the newly-opened trails since alternative game trails through the forest were often blocked. We will analyze the data in detail in the new academic year to estimate jaguar abundance and density.

Big Falls Camera Survey – We conducted this survey during and after forest fires. Even though our field staff worked extremely hard and often took risks to save equipment, many camera traps were lost in the fires. This survey revealed very low activity of jaguars and key prey species, coupled with extensive human activity: primarily hunters and illegal loggers. The survey clearly shows degradation of the area since 2009. Despite this, a small herd of white-lipped peccary was detected since the forest fires, as well as the continued presence of tapirs. These white-lipped peccaries probably represent one of the few herds still present in Belize

outside of protected areas. We are now planning the safe capture and collaring of white-lipped peccaries and tapirs.

CBWS Camera Survey – We conducted this survey from April to July 2011 in order to assess the density of the jaguar population in the CBWS. The CBWS represents one of the sites in Belize and the region with the longest history of monitoring jaguar populations. The results of this survey will be analyzed in detail in the upcoming academic year; however, the survey revealed that 40 percent of jaguars photographed were older than 10 years and of these, half are as old as eleven to twelve years of age. This is the first record of wild jaguars reaching such a long life span indicating the importance of long-term monitoring. Our continued long-term monitoring will eventually provide unique information on the life history of jaguars in terms of survival and recruitment rates. No other jaguar population in the world has been monitored so extensively and the ERI is therefore providing cutting edge information, vital for the management of this species in the wild.

National game meat survey –Belizean and UK students working with the ERI carried out a nationwide game meat survey in late June 2010. They conducted this survey at strategic bus stops throughout the country (Corozal, Orange Walk, Belize City, Belmopan, San Ignacio, Dangriga and Punta Gorda). The questions in the survey considered how much meat is eaten per week in the household of the interviewee and of what type. The preliminary results indicate that Belizeans still rely heavily on the wild for their meat. If we include sea and river fish, approximately 37 percent of the meat eaten by Belizeans originates from the wild. When considering real meat (livestock, poultry and terrestrial wildlife), 13% is hunted wildlife. The gibbon or paca takes up the largest proportion of the wild game but the endangered hicatee is still eaten in considerable numbers. The total figures indicate that game meat is important for Belizeans and management of this resource is vital for the future of the country. We are still working on the data and are currently reanalyzing the preliminary figures for peer-reviewed publications.

Botanical Research

During this academic year, our botanical research once again focused on the lowland savannas of Belize through the Darwin Savanna Project. Field work involving plant diversity surveys and collection by the UK and ERI Darwin Botanists, Zoë Goodwin and German Lopez, respectively, was finalized this year. A checklist of the lowland savanna plants of Belize was prepared by authors from several of the partner institutions in the Darwin Project, including the ERI, and was submitted to the journal *Phytotaxa* for peer-review. Two major advances of the Darwin Savanna Project during the academic year that will enable the ERI and other institutions to continue advancing botanical research in Belize are: the re-curation of the Belize National Herbarium housed at the Forest Department (FD) and the continued updating of a botanical database using the Botanical Research and Herbarium Management System (BRAHMS).



Training and Fellowships

Our Training and Fellowships Program continued to be one of our most active programs during the 2010-2011 academic year. More than 40 UB students from the University, mostly from the NRM Program, directly benefited from ERI internships, student assistantships, student volunteer opportunities and ERI staff expertise through courses. In addition more than 20 NRM Professionals/Practitioners, excluding ERI staff, benefited from training and professional development activities as part of our work.

One of our main accomplishments in the *Training and Fellowships Program* this year was the successful launch of UB's first graduate degree program, a Regional Master of Science (M.Sc.) in Biodiversity Conservation and Sustainable Development offered in partnership with three other Caribbean Universities: University of the West Indies-St. Augustine (UWI-St. Augustine), University of Guyana (UG) and Anton de Kom University of Suriname (ADEKUS). The ERI led efforts to develop the program at UB and obtain approval for it to be offered, as well as to institute a selection process for the acceptance of candidates into the program. The ERI worked in partnership with the Provost's Office and many other offices/departments at the University to accomplish this.

During this year we also embarked on the development of a National Training Program for Protected Areas Management in partnership with the Center for Protected Areas Management Training (CPAMT) at Colorado State University (CSU) and the Ya'axché Conservation Trust (Ya'axché). The Oak Project provided some support for the development of the program but the initiative is also a major part of the *Strengthening National Capacities for the Operationalization, Consolidation, and Sustainability of Belize's Protected Areas System Project* funded by the Global Environmental Facility (GEF) and managed by the National Protected Areas Secretariat (NPAS), Ministry of Natural Resources and the Environment (MNRE) in conjunction with the United Nations Development Programme (UNDP).

Undergraduate Student Training

In the 2010-2011 academic year, our staff taught a total of four required courses within the Bachelor in NRM program (NRMP) and assisted as advisors for three additional required courses. These are summarized below.

- **NRMP Wildlife Management Course**

For the third year running, Dr. Bart Harmsen taught the Wildlife Management course in association with Dr. Rebecca Foster (Panthera), as part of the NRM Program. This is a theoretical and field-based course. This year, 11 final-year Bachelor students participated in the course in January 2011. In addition to learning about the theoretical and methodological issues of wildlife management, the students were exposed to hands-on field research by joining the Large Mammal Corridor Project in the CBC. The project introduced them to camera trapping, live capture of medium-large mammals and telemetry. This year's group was fortunate enough to be present for the live capture, processing and release of a kinkajou. Course material, transportation costs and logistic support for the course was provided by the ERI through the Darwin Initiative.



Grey fox on table



Female kinkajou being measured

- **NRMP Tropical Forest Ecology and Management Course**

Dr. Elma Kay taught the annual Tropical Forest Ecology and Management field course to 10 final year Bachelor students in February 2011. Apart from some preliminary lectures in the classroom, the course takes place in the field, mainly in the Mountain Pine Ridge Forest Reserve (MPRFR) and the Chiquibul Forest. This year students got hands-on experience in sampling tree diversity, soil sampling as well as in fire management practices in the MPRFR. In addition they got firsthand experience with carbon stock assessment practices in permanent sample plots in the Chiquibul Forest under the direction of Mr. Percival Cho. As part of the course students also visited three logging sites this year in the Chiquibul Forest Reserve, Gallon Jug and the Rio Bravo Management and Conservation Area (RBCMA), and a teak plantation in Roaring Creek owned by Paul Martin. The Forest Department graciously provided accommodation and logistic support for students at the Douglas D'Silva Forest Station in the MPRFR, as well as provided expertise in fire management through Mr. Domingo Ruiz. Logging concessionaires hosted and/or provided logistic support for students on logging site visits. The ERI prepared course materials. The ERI, the Science Department and Physical Plant provided logistic and other support for the course with the Science Department providing the equipment and the NRM van.



Domingo Ruiz (FD) introduces students to tools used in a prescribed burn



Percival Cho (University of Lancaster) demonstrates collection procedures for carbon stock assessment



Anignazio Makin of Ya'axche Conservation Trust supervises student as he samples macroinvertebrates

- **NRMP Fisheries and Aquaculture Management Course**

Dr. Leandra Cho-Ricketts taught the annual field-based Fisheries & Aquaculture Management Course to 10 final year Bachelor students in April 2011. This course included a site visit to the Royal Maya Shrimp Farm where students got a firsthand view of aquaculture operations and a 6-day field component at the CCFS where students participated in fish surveys, fisheries data collection for conch, lobster and finfish, fisheries monitoring and surveys of fishers within the Turneffe Atoll, and testing the efficiency of different fishing gears. Fuel for this field component to Turneffe was covered through the CCFS budget; accommodation fees at the CCFS were waived for students and the ERI prepared course materials. The ERI, the Science Department and Physical Plant provided logistic support for the course with the Science Department providing the equipment and the NRM van.



Students conducting deep sea fishing



Students practicing underwater size estimation

- **NRMP Field Methods and Assessment Course**

Drs. Kay and Drs. Cho-Ricketts taught the terrestrial and marine portions, respectively, of the annual Field Methods and Assessment Course to 14 NRM Bachelor program students. This course was delivered as a full field course in May and June 2011 with students spending one week at Las Cuevas Research Station (LCRS) in the Chiquibul Forest and one week at the CCFS in the Turneffe Atoll. Through hands-on activities the course exposed students to techniques for assessment and monitoring various groups of organisms and ecosystems. Course materials were supplied and prepared by the ERI; the Science Department and Physical Plant provided logistic support, with the Science Department providing equipment and the NRM van for the course.



Students conducting plankton surveys as part of marine field methods

- **NRMP Internships and Independent Thesis Projects**

During summer session, Dr. Bart Harmsen and the ERI-Panthera wildlife team supervised two student interns from the Bachelor NRM program as well as the data collection for an independent thesis project by a student in the same program. The internships and thesis project data collection involved radio tracking of mammals in the CBC through the Darwin Large Mammal Corridor Project. Celso Cawich, Marine Biologist, supervised two interns working on sea-turtle nesting at the CCFS in the summer. Dr. Leandra Cho-Ricketts supervised the completion of one thesis project within the Bachelor NRM program. This thesis research covered an assessment of *Diadema antillarum* (long-spined black sea urchin) populations in Glover's Reef Atoll for 2010 and compared this with previous years data, from 2007-2009.

- **Student Volunteer training**

We trained 10 student research volunteers representing multiple UB academic programs during the academic year in monitoring techniques and/or Open Water dive certification through the Oak Project. They mainly assisted with the ERI's marine monitoring program in the Turneffe Atoll but also helped with monitoring efforts at other sites managed by ERI partner organizations, including Glover's Reef.

As part of the Darwin Large Mammal Corridor Project, we hosted a total of 22 volunteers who received training in mammal trapping and radio tracking. Seven of these volunteers were from Belize and the rest from various parts of the world including the United Kingdom, Slovenia and the Netherlands.



Student Volunteer

- Undergraduate textbook

In addition to direct training of students, we have been involved in the Edulink Caribbean Reef Education and Training Initiative (CREATive) Project funded by the European Union (EU), which has as its objective to contribute towards: better, science-based management and conservation of the Caribbean's economically-important coral resources and more regionally-initiated research on the Caribbean's reefs. The project is a partnership involving UB, UWI (Cave Hill, St. Augustine and Mona) and the College of the Bahamas. A major output of this project is the production of a Caribbean coral reef textbook. During the academic year, the ERI in conjunction with NRM Program Faculty, continued to work on developing the textbook's Chapter 6 on *Threats to coral reefs* as part of UB's contribution to the project.

Graduate Student Training

A major accomplishment of our *Training and Fellowships Program* this year was the successful launch of the Regional Master of Science (M.Sc.) in Biodiversity Conservation & Sustainable Development, UB's first graduate program offering, in June 2011. Development of the M.Sc. is the major output of an EU Edulink-funded project involving four partner universities in the Caribbean: UB, UWI-St. Augustine, UG and ADEKUS. In December of 2010, the ERI, which serves as the focal point for the project at UB, attended a partner's meeting in Guyana to finalize program contents. Subsequent to this, in collaboration with the Provost, Assistant Provost and Admissions' Offices and FST, especially the Department of Science, we led the process for program approval, program launch and candidate selection at UB, as well as coordinated course development by UB faculty. A total of 21 applicants underwent candidate selection for the program, which included face to face interviews as the final step. At the close of the academic year, 13 candidates had been offered an acceptance into the program and the Protected Areas Conservation Trust (PACT) had already launched its Environmental Fellowship Award Program designed to award a scholarship to a Belizean candidate accepted into the M.Sc.

Training of Professionals

In addition to working with the young generation of natural resources managers and scientists, one of the major goals of our *Training and Fellowships Program* is to provide training opportunities to NRM practitioners to build capacity for management and science-based decision-making. During this academic year, the ERI made significant efforts in accomplishing this goal through the development of a National Training Program for Protected Areas Management. The development of this training program was envisioned in the National Protected Areas System Plan (NPASP) and was assigned for implementation to UB under the operational framework for its implementation. As such, the design and implementation of this program had already been integrated into ERI work plans.

The ERI advanced the development of the training program in partnership with CPAMT at CSU and Ya'axche. The program is also as a key component of the *Strengthening National Capacities for the Operationalization, Consolidation, and Sustainability of Belize's Protected Areas System Project* managed by the NPAS, MNRE in conjunction with the UNDP. The ERI worked very closely with the NPAS in the development of the training program. We conducted a national training needs assessment for protected areas management as the first step. This assessment highlighted several areas for training under the following priority categories: research and monitoring, institutional capacity and strengthening, ranger training, sustainable financing and protected areas management effectiveness. In July 2011 a stakeholder workshop was held at the University to validate the results of the training needs assessment and the elements for inclusion in the training program. We are now working on the design and contents of the training program.

In addition to the National Training Program for Protected Areas Management, we were involved in the coordination and/or delivery of several other training opportunities for natural resources managers. These are outlined below:

- As part of the Darwin Savanna Project, we coordinated and helped to teach a course entitled: "An Introduction to the Vascular Plants of the Belizean Savanna" from November 2-5, 2010 at Paynes Creek National Park. Participants included three staff of Ya'axche and eight staff from TIDE.
- Through the Darwin Savanna Project we coordinated the awarding of scholarships to Elmar Requena of TIDE and Rolando Caballero of the Department of Science at UB to attend the 11-day RBGE Field Course in plant taxonomy and identification held at Hillbank in January of 2011. Subsequent to this field course, the UK Darwin Botanist and RBGE staff offered an advanced 3-day training in plant curation and taxonomy at the ERI that was attended by participants from Ya'axche, TIDE and FD.
- We worked with Dr. Thomas Rainwater, Central American River Turtle (*Dermatemys mawii*) researcher and instructor, to coordinate two training sessions for monitoring of this endangered turtle, also known as hicatee. The sessions were held in Rio Grande, Toledo and at the Lamanai Field Research Center, Orange Walk. Participants from the following partner organizations participated in the training: Community Baboon Sanctuary, TIDE, Ya'axché, Fisheries Department, BAS and the Lamanai Field Research Center. This training was conducted with support from the Turtle Survival Alliance (TSA).

Training of ERI Staff

During the academic year a number of ERI staff benefited from targeted training opportunities through ERI-managed projects or other partnerships and initiatives. Highlights of these are summarized below:

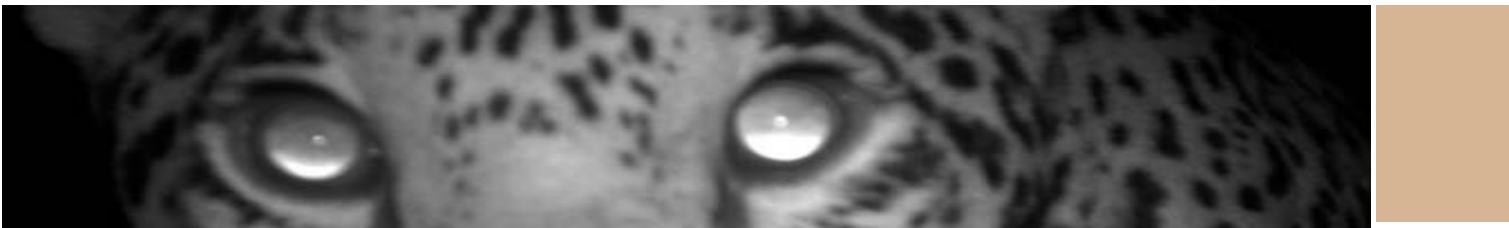
- Our Darwin Botanist, German Lopez, received substantial training this year in the UK in herbarium curation, including databasing and specimen mounting, as part of the Darwin Savanna Project. In addition he also received significant training in Belize in forest inventory, and plant identification and the measurement of permanent sample plots in broad leaf forests.
- Our Darwin Wildlife Biologist, Said Gutierrez received training in hicatee monitoring methods as well as chemical immobilization of trapped animals. Said was also assigned to the Land Information Center (LIC) at the MNRE as a trainee/assistant to aid in the collection and data entry of land tenure data in the CBC in GIS.
- Our Marine Biologist, Celso Cawich received significant training during the academic year as a result of various projects, partnerships and the MAR Leadership Program. He received training in coral nursery out-planting, SPAG's monitoring, AGGRA monitoring, sea turtle monitoring and conservation action planning, amongst others. This year Celso also received training in Mexico on the opportunities and challenges of working with fishing communities in the management and protection of fishery resources.
- Jani Salazar, our Database/Research Student Assistant received Open Water Diver training as well as training for sea-grass, mangrove, coral and fish monitoring.
- Several ERI staff from Belmopan and the CCFS took part in advanced first aid training facilitated by the Belize Emergency Response Team (BERT). In addition, the CCFS Station Manager, Kenneth Gale and ERI Marine staff: Celso Cawich and Dr. Leandra Cho-Ricketts participated in the CPR/AED training course provided by BERT.



Fellowships

Dr. Bart Harmsen is our Panthera Jaguar Research Fellow in Wildlife Conservation. He is responsible for all wildlife initiatives at the ERI including oversight of activities related to the Panthera Collaboration and Darwin Large Mammal Project. Dr. Harmsen teaches the Wildlife Management Course of the NRM Bachelor Program offered through the Department of Science and is an advisor to UB student interns and independent thesis project students.

At the end of the academic year, we were also reviewing applications for an ERI Marine Fellowship to be granted to a Lecturer from within the University, to work with us on a priority marine research project under the National Environmental and NRM Research Agenda. The Oak Project is providing the support for the ERI Marine Fellow.



Communication and Outreach

Our *Communication and Outreach Program* serves to communicate the results of our work and reach out to new and existing partners through participation in relevant initiatives. Some of the key activities under the *Communication and Outreach Program* during the academic year are listed below.

Workshops and Conferences

During 2010-11, our staff participated in and coordinated several workshops and conferences. On December 7, 2010, the ERI, the TSA, the Fisheries Department and the Belize Foundation for Research and Environmental Education (BFREE) hosted the first Hicatee Conservation Forum and Workshop at UB. The forum served to present the latest research and updates on the status of hicatee in Belize and the National Hicatee Conservation and Monitoring Network (NHCMN) was conceived at the workshop.

Our personnel gave presentations at the First Mexico-Belize Conference hosted by the Science Department in February 2011. Our Marine Biologist presented on the extent of damage to the mangroves, seagrass and coral reef communities at Calabash from Hurricane Richard; our Science Director (Marine) presented a summary of the National Environmental and NRM Research Agenda to stimulate collaborative research discussions with Mexican partners; our Wildlife Biologist gave a presentation on the work being done under the Central Belize Wildlife Corridor.

The University, through the ERI, and the Mesoamerican Society for Biology and Conservation Belize Chapter also hosted and organized the 5th Annual NRM Symposium under the theme ***“Natural Resources Management in the context of climate change, a focus on Belize”*** on March 25th 2011.



GIS workshop delivered by Emil Cherrington of CATHALAC

Partnerships and Networks

In the 2010-11 academic year we continued to actively forge partnerships and links for research through our network of contacts. This included a sub-grant from the WWF to pursue ground truthing of the 2010 Mangrove Map of Belize produced by CATHALAC, which falls under marine research priority 1 of the National Environmental and NRM Research Agenda.

In the first year of the Oak project we actively built partnerships and networks both within Belize and abroad, signing several partnership agreements and Memoranda of Understanding (MoUs) with the Healthy Reefs Initiative in Belize, Seagrass Net and University of New Hampshire, the Oceanic Society, the Fisheries Department and University of the West Indies-St. Augustine. We have also been building collaborations with WWF, TNC and Coastal Zone Management Institute among others. Through the development of the National Training Program for Protected Areas Management we have forged a strong partnership with the Ya'axche Conservation Trust, the CPAMT at CSU and the NPAS in the MNRE. In addition, through our wildlife research and monitoring work the ERI entered into an active collaboration with BAS this year.

In addition to these partnerships/collaborations we are actively involved in several national networks related to monitoring. In the marine realm we are actively involved in the SPAGs and CORAL networks for collecting data on spawning aggregations and coral bleaching, respectively. Apart from contributing data, we also manage and maintain the monitoring databases associated with these networks.



In the terrestrial realm the ERI was elected as the coordinator of the NHCMN which is comprised of over 15 partner institutions and individuals. The NHCMN represents a first active network comprised of NRM institutions working in terrestrial areas. In 2011, the ERI organized two network meetings as well as a planning meeting of the NHCMN Steering Committee to determine priority activities in three key areas: Legislation and Enforcement, Science, and Public Awareness and Outreach. This year we worked closely with the Fisheries Department in coordinating network activities. In March-April of 2011, the ERI participated in a hicatee public awareness campaign led by Ya'axche, and coordinated and organized hicatee monitoring training. During this academic year the ERI received a grant from the TSA for enforcement and other activities of the network.

National Committees

Apart from partnerships with other academic institutions and non-governmental organizations we are also forging meaningful collaborations with Governmental Agencies such as the Fisheries Department, FD and the NPAS. One of the primary ways in which we are doing this is through our work in relevant national committees and participation in national initiatives. During the 2010-2011 academic year we were very active in the work of the National Protected Areas Technical Committee (NPATC) and the Turneffe Atoll Sustainability Council (TASC). In addition, we were also appointed a member of the Belize National Climate Change Committee.

Publications

One of the main accomplishments of the ERI during the 2010-2011 academic year was the completion and publication of the National Environmental and NRM Research Agenda. In addition ERI staff authored or co-authored 10 other technical and scientific publications. Our publications for the year are listed below and full text for these and new publications can be found on the ERI website.

Foster, R. J. & B.J. Harmsen (In press). A critique of density estimation from camera-trap data. *Journal of Wildlife Management*.

Goodwin, Zoë A. D. J. Harris, S.G.M. Bridgewater, G.N. Lopez, E.M. Haston, I.D. Cameron, D. Michelakis, J.A. Ratter, P.A. Furley, E. Kay, C. Whitefoord, J. Solomon & N. Stuart (In press). A checklist of the vascular plants of the lowland savannas of Belize, Central America. *Phytotaxa*.

Harmsen, B. J., R. J. Foster, S.C. Silver, L.E.T.Ostro, & C.P. Doncaster (2011) Jaguar and puma activity patterns in relation to their main prey. *Mammalian Biology*, 76 (3): 320-324.

ERI 2010. National Environmental and Natural Resources Management Research Agenda, University of Belize, Belmopan, Belize. Can be accessed at:

http://www.eriub.org/index.php?option=com_docman&task=cat_view&gid=50&Itemid=99

Foster R. J., B. J. Harmsen, B. Valdes, C. Pomilla & C. P. Doncaster, C. P. (2010) Food habits of sympatric jaguars and pumas across a gradient of human disturbance. *Journal of Zoology*, 280: 309-318.

Foster, R. J., B. J. Harmsen, & C. P. Doncaster (2010) Habitat use of sympatric jaguars and pumas across a gradient of human disturbance in Belize. *Biotropica*, 42 (6): 724-731.

Foster, R. J., Harmsen, B. J., & Doncaster, C. P. (2010) Sample-size effects on diet analysis from cats of jaguars and pumas. *Mammalia*. 74 (3): 317-321

Harmsen, B. J., R. J. Foster, S. Gutierrez, S. Marin & C.P. Doncaster (2010) Scrape-marking behaviour of jaguars and puma. *Journal of Mammalogy*, 91 (5): 1225-1234.

Harmsen, B. J., R. J. Foster & C. P. Doncaster (2010) Heterogeneous capture rates in low density populations and consequences for capture-recapture analysis of camera-trap data. *Population Ecology*, 53(1): 253-259.

Harmsen, B. J., R. J. Foster, S.C. Silver, L.E.T. Ostro, & C.P. Doncaster (2010) The ecology of jaguars in the Cockscomb Basin Wildlife Sanctuary, Belize. Pp 403- 416. In D. W. Macdonald & A. Loveridge, eds. *The Biology and Conservation of Wild Felids*. Oxford University Press.

Harmsen, B. J., R. J. Foster, S. Silver, L. Ostro & C. P. Doncaster (2010) Differential use of trails by forest mammals and the implications for camera trap studies, a case study from Belize. *Biotropica*, 42: 126-133.



Calabash Caye Field Station (CCFS)

We completed our second year of managing the CCFS. It was a very challenging year for the field station which suffered a direct hit by Hurricane Richard in October 2010. The hurricane caused over BZ\$500,000 in damage with the loss of the staff quarters, extensive damage to the solar/wind system and main pier and damage to the main lecture hall, kitchen and dorms. We responded immediately to seek funds to rebuild the field station and were successful in obtaining a technical assistant grant of BZ\$40,000 from the Sistema de Integración Centroamericana (SICA) through its Energy and Environment Program (EEP) for the repairs and rehabilitation of the solar/wind energy system at the CCFS. Insurance claims also provided for the repair of damage to the buildings left standing and replacement of equipment lost or damaged during the hurricane. We submitted a request to the Oak Foundation in March 2011 to fund the rebuilding efforts at the CCFS and were successful in receiving a challenge grant in July 2011 from the Oak Foundation in the amount of BZ\$400,000, with the condition that the University raises another BZ\$400,000 to match Oak's support. We are now seeking the BZ\$400,000 match funds to the Oak Foundation Challenge Grant in coordination with our UB Development Office.



Hurricane damage to the CCFS—(left) destroyed staff quarters and damaged solar panels;
(right) damage to lecture hall and trees on the island

Despite the major hurricane setbacks, with the help of the Physical Plant staff, Science Department students and staff, and the CCFS staff we were able to clean the debris and fallen trees at the field station and were able to host the first visitor group in November 2010. The insurance claim funds and the SICA grant were instrumental in enabling repairs to the water tower, communication tower and systems, the lecture hall, kitchen area and the solar/wind energy system, installation of a new satellite dish and equipment to access the internet, which got the field station back to basic operational mode. This allowed the CCFS to be able to host groups during its busiest period, February to June 2011. During the academic year we hosted a total of 25 groups; 12 of which were local and 13 of which were foreign. The majority of the groups hosted were student groups.

Vessels

The vessel fleet for the CCFS was increased through addition of the *Rhizophora* and the *Pelicanus*, two 25 ft vessels that were refurbished. The main purpose of these smaller more fuel efficient vessels is to transport researchers and student groups to sites within the Atoll. These vessels can also be used to transport staff and small quantities of supplies from the mainland depending on weather conditions.

Upgrade of facilities

Besides all the major repairs from hurricane damage listed earlier, the main upgrades to the CCFS facilities was refurbishment of the shower building, through the installation of tiles, new faucets and hand basins and the complete rewiring of the phone lines, issuing of a new telephone number (501-242-9262) and enhancement of the phone service.

Sustainability

The long-term sustainability of our programs is a key focus of the ERI. In this respect the biggest advance this year was the completion of a draft business plan for the ERI and CCFS which outlines the directions and details the approaches to be undertaken by the ERI in order to obtain the support it needs to continue its operations. Another important issue with respect to the sustainability of the ERI and our programs involves our need for infrastructure, primarily in the form of adequate facilities to house offices, research and training labs and natural history/biodiversity collections for the country. In working towards obtaining the appropriate infrastructure to support our work, we have now developed a case statement for a green designed building project. The proposed green-building will serve as a model of sustainability for the region and will be able to support climate change and biodiversity research, training and awareness. We are now working in collaboration with our UB Development Office to determine the feasibility of this project.

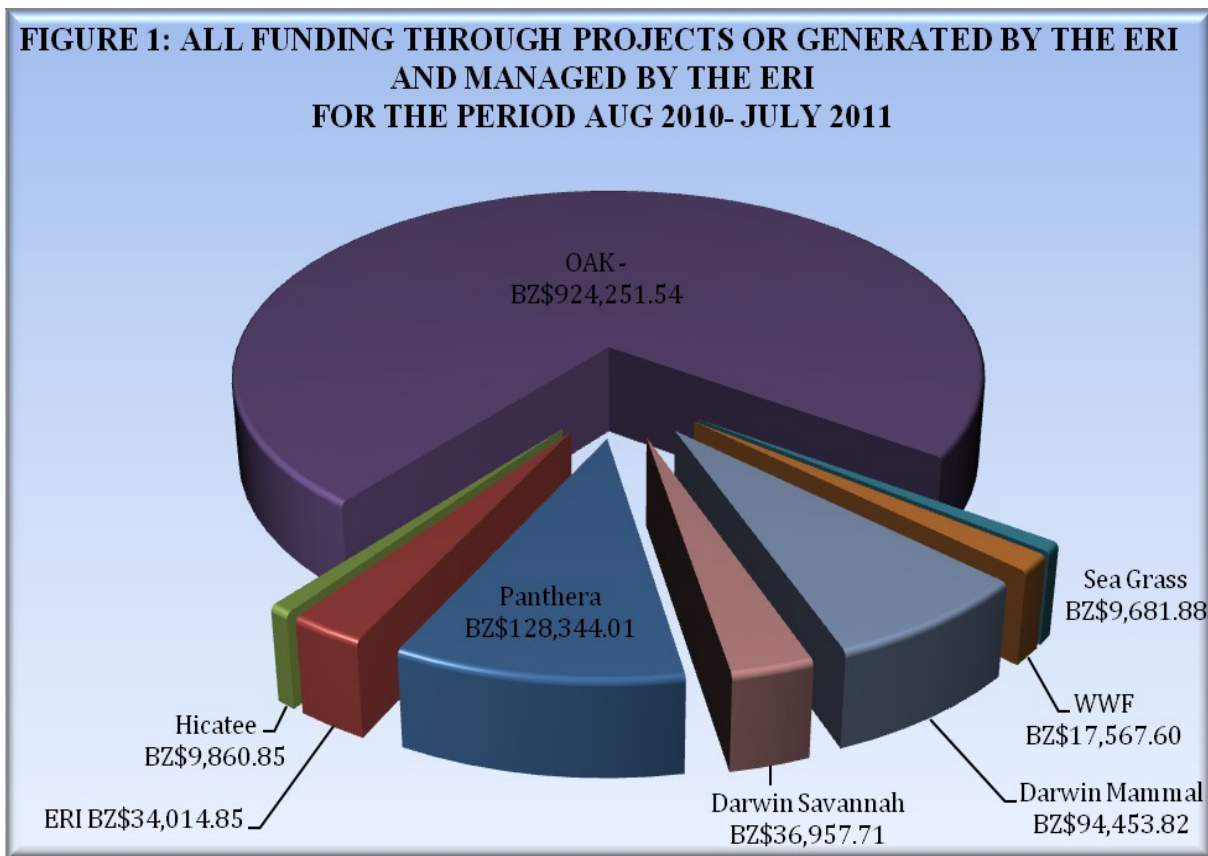


You can request a copy of our green-building project case statement from Dr. Elma Kay at ekay@ub.edu.bz.

Financial Summary

During the 2010-2011 academic year, we directly managed a total of BZ\$1,255,132.26 comprised of BZ\$336,825.47 in project/donor funds brought forward from the previous academic year (2009-2010) and BZ\$918,306.79 received during the 2010-2011 academic year. The brought forward funds from 2009-2010 represent the overlap of reporting cycles between the projects managed and the university's academic year, which runs from August to July.

A breakdown of the BZ\$1,255,132.26 project /ERI generated funds is itemized in Figure 1.



In addition, the University of Belize, through its budgetary process, allocated BZ\$287,459.00 toward the operations of the CCFS and BZ\$243,224.00 to cover primarily staffing and some operational costs of the ERI. These funds were managed through the UB Central Accounting System.

Operational expenditures during the academic year for all ERI managed funds are highlighted in Figure 2. The three largest recorded project expenditure amounts during the period occurred under the OAK Foundation, Panthera and the Darwin projects in the ratios of 45%, 25% and 16% respectively. Net surpluses recorded as at the close of July 31, 2011 will become the opening balances in the new academic year.

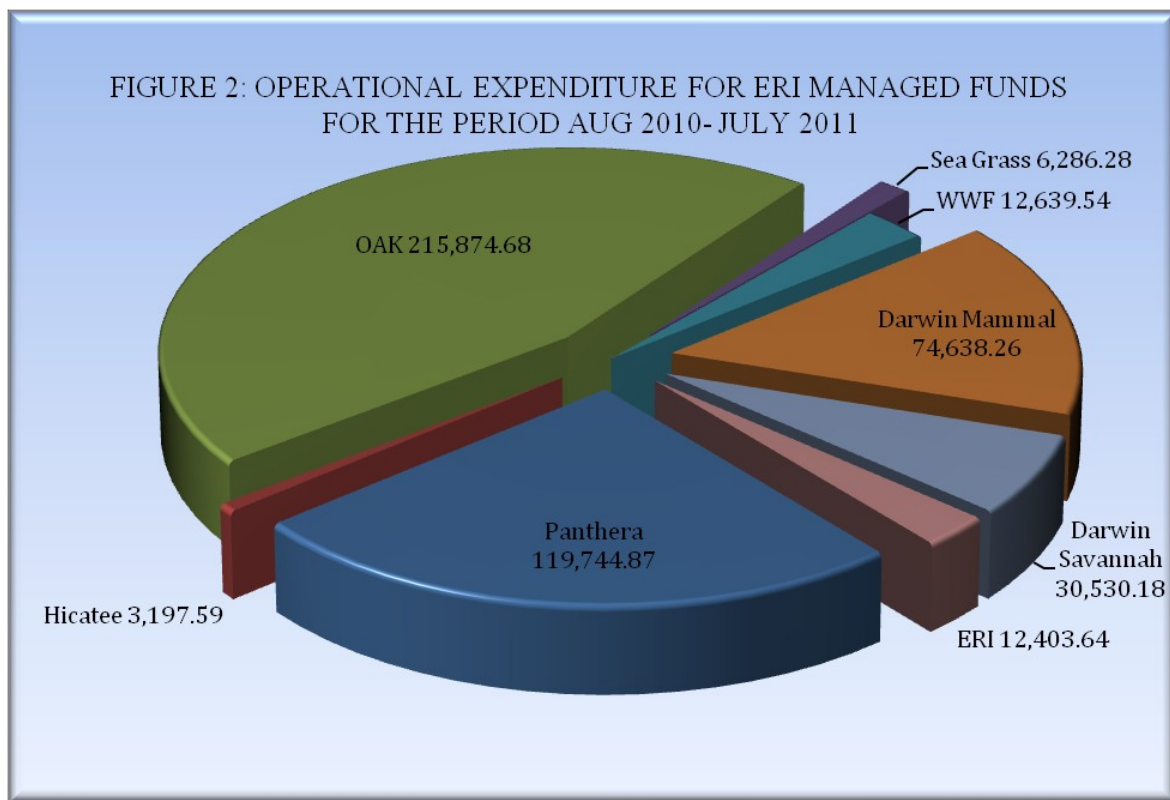
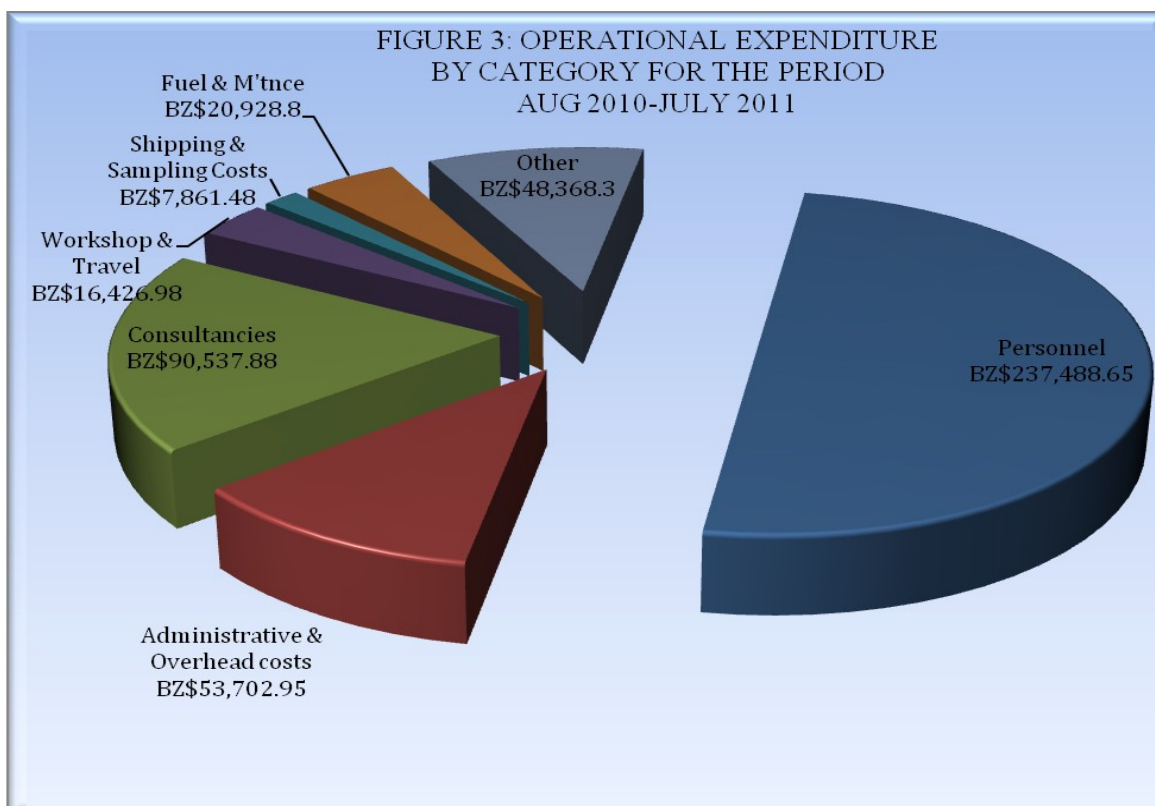


Figure 3 captures a summary of the categorized spending on all projects, the three largest being Personnel emoluments at 50% of expenditure; consultancies to complete the Strategic and Business Plans of the ERI and well as the Building Project donor funding exercise – 19% and Administrative and Overhead costs –11%. Assets funded through ERI managed funds stood at BZ\$550,273.87 at the close of July 31, 2011.





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