

**EDINBURGH UNIVERSITY HERPETOLOGICAL EXPEDITION TO LAS  
CUEVAS, CHIQUIBUL FOREST RESERVE, BELIZE : JULY – SEPT 2000**

# Project Anuran



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## **Abstract**

The scientific community is deeply concerned over declines in Amphibian populations world wide, especially in regions previously thought to be 'pristine'. Candidates for causing this decline include; ozone depletion, acid precipitation, aerial pollution and global warming. There is a growing demand for short and long-term surveys of populations in an attempt to ascertain the causes of this decline, and furthermore to slow it's progress. The region of Chiquibul Forest in Belize harbours some of the most undisturbed sub-tropical forest patches in Central America. As such the region is an excellent site to monitor amphibian populations apparently protected from habitat disturbance or poaching. The research aim of the project is to contribute to the understanding of the ecology and conservation of frogs and toads in the region of Las Cuevas, Chiquibul Forest Belize, by collecting baseline data on their abundance and diversity. Our work is tied in directly with the aims and work of the IUCN group, the Declining Amphibian Population Task Force. Surveying methods will include; visual encounter surveys (VES), drift net fence arrays and vocal records of breeding ponds. Measurements will be made of environmental variables – climate and micro-habitat surveys including a record of the key floral species at each site-such data will be used to assess anuran distribution. A further aspect of the work is to establish a long term survey regime of the same transect sites through collaboration with the University College of Belize and the Natural History Museum (London). Two Belizean ecology students will comprise part of our team for the field stage, which will be instrumental in establishing close ties with the University Biology Department.

## **Background and Justification**

Amphibians are integral components of many ecosystems often comprising the highest fraction of vertebrate biomass (Blaustein & Wake, 1990; Blaustein et al, 1994; Pearman, 1997). They can frequently be observed as top carnivore species (Blaustein & Wake, 1990; Wake, 1991) especially in tropical ecosystems where different species can play pivotal roles in energy budgets as both predators and prey (Beebee, 1996; Blaustein et al, 1994), and as such any significant population depletions can have profound effects on whole communities. Moreover, as highlighted by many (eg, Blaustein & Wake, 1990; Crump et al, 1992; Beebee, 1996) amphibians are excellent indicators of environmental stress. This is due to their biphasic lifestyle - inhabiting both terrestrial and aquatic ecosystems (hence abnormally susceptible to bio-magnification of chemicals) and their highly permeable skin (Duellman & Trueb, 1994; Berven, 1990). Their use as subjects for environmental disturbance is further promoted by the relative ease with which they can be researched (Beebee, 1996). Recent reports have brought to world-wide attention the possibility that amphibian populations have, since the mid 1970's, been undergoing population decline, range reduction and even extinction (Blaustein & Wake, 1990; Barinaga, 1990; Wake, 1991; Pechmann et al, 1991; Crump et al, 1992; Blaustein et al, 1994; Pounds & Crump, 1994; Blaustein & Wake, 1995; Beebee, 1996; Campbell, 1998). Although stochastic fluctuations that can contribute to natural extinctions and colonisations in all communities cannot be disregarded entirely, it is considered unlikely that such reports are coincidental, but do indeed point to a real decline in numbers across a whole class of vertebrates (Wake, 1991; Pechmann et al, 1991). Amphibia is a class of vertebrates that has survived virtually unchanged since the era of dinosaurs (Wake in

Barinaga, 1990). If this resilience is now showing a sudden decline there is reason for serious concern. The importance of this subject was reflected by the establishment of an IUCN working party, the Declining Amphibian Population Task Force (DAPTF) in 1991, to monitor sites world-wide and advise on necessary courses of action.

Whilst some declines can be attributed to direct human impacts - habitat destruction, introduction of exotic diseases and predators, and poaching (Blaustein et al, 1994) - more perplexing declines have been observed in remote areas seemingly protected from human interference (Blaustein & Wake, 1990; Pounds & Crump, 1994). One well studied example is in the immediate vicinity of Belize, the mysterious loss of 19 out of the 49 species of anurans inhabiting the Monteverde region of Costa Rica in the last decade (Campbell, 1998). A number of more indirect anthropogenic causes have been suggested to have produced these declines; acid precipitation (Blaustein & Wake, 1994), chemical pollutants (Heyer et al, 1998), increased UV radiation, and even global climate change (Blaustein & Wake, 1990; Wake, 1991), all of which can be attributable to the extreme sensitivity of amphibia to environmental disturbance. It is this special susceptibility to environmental change that demands particular attention for both study and conservation of the taxa, and as a consequence it is widely believed that amphibians can serve as useful bio-indicators of environmental health and resilience (Wake, 1991)

There is a noted absence of a consensus on the causes of a global decline in amphibian numbers due to the dearth of short and long term comprehensive studies on amphibian populations world-wide (Barinaga, 1990; Wake, 1991; Crump et al, 1992; Blaustein et al, 1994; Beebee, 1996). Belize contains some of the most extensive and valuable stretches of forest in Central America (Furley, 1998) retaining 75% of its natural vegetation (Harcourt, 1994) and is a haven for much of the wildlife that has vanished from other surrounding areas (Romney et al, 1959; Hartshorn et al, 1984; Meyer & Foster, 1996). Many populations of various species which are classified under CITES Appendix I and II in neighbouring regions enjoy relative prosperity within Belize's remarkably 'pristine' habitats (Hartshorn et al, 1984). Moreover, the biology and abundance of many of its amphibian species remains largely unknown (Campbell, 1998; Stafford personal communication, 1999) – this can be further reflected by discovery of 5 of the 33 known Belizean anuran species between 1990 – 1995 (Meyer & Foster, 1996). These facts about this remarkable land serve to proffer it as an ideal country within which relatively undisturbed anuran populations can be observed and provide possible clues as to these often mysterious global declines. The Chiquibul Forest reserve situated in the forested interior, west of the Mayan mountain divide represents one of the most ecologically important forests in Belize (Bird, 1998). Furthermore, it harbours an especially unknown and undisturbed herpetofauna (Stafford, 1991; Meyer personal communication, 1999) and as a consequence there is a high chance of population declines or even extinctions passing by unmonitored. The DAPTF, in recognition of the secrets and understanding this region could unveil, is co-ordinating the Mayan Forest Anuran Monitoring Project (MAYAMON) aiming to survey amphibian populations throughout the whole of the Mayan region. This will serve to provide long term data on numbers and distribution, alongside acting as an early warning network for the environmental causation and predictions of any future declines / disturbance. To realise these aims the project is in need of intensive studies to be carried out concerning status of vocalising and non-vocalising populations. Only once baseline knowledge has been obtained can real population declines be

separated from where normal stochastic fluctuations are occurring, possible coincident implications of environmental degradation be recognised, and conservation management practices be put into action.

## **Aims & Objectives**

### Research Aim

To contribute to the understanding of the ecology and conservation of frogs and toads (Amphibia : Anura) in the region of Las Cuevas by providing baseline data on existing populations.

### Research Objectives

- 1) To investigate the status and distribution of understudied non-congregating anurans of *Eleutherodactylus* spp. along varied transects around Las Cuevas.
- 2) To assess changing species composition and relative vocalising activity of congregating species at night
- 3) To record the abiotic environment at survey points, ie relative humidity, temperature.
- 4) To survey major vegetation types and key floral species at transect sites.

### Further Aims

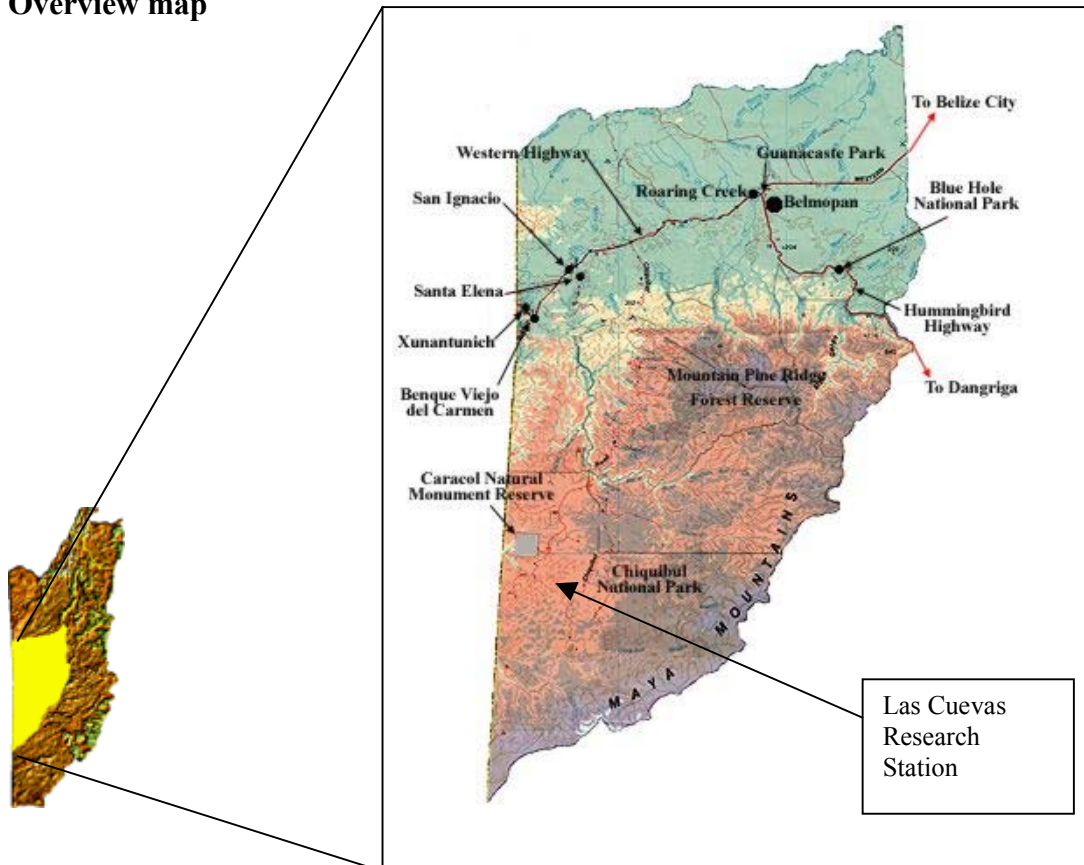
- 1) To provide necessary baseline data to support the initiation of possible long-term surveys to further the aims of the IUCN Declining Amphibian Population Task Force MAYAMON project in the monitoring and conservation of declining amphibians in the Mayan region.
  - To be achieved by establishing close collaboration with students and staff at the University College Belize with the goal to setting up surveying of the above transects on a long-term basis to assess population changes over generations
- 2) To broaden the experience of all the team in field work and aspects of tropical ecology alongside providing a chance for educational interaction between ourselves and Belizean students.

## **Methodology**

### Site description:

Las Cuevas Research Station (N16°44' W88°59') is situated in the Chiquibul Forest Reserve, lying within a much larger protected area of the Mayan Mountains – see site description map. It stands at about 500m with an annual rainfall of 1500 mm and a vegetation mainly constituted by lowland subtropical moist forest (Hartshorn et al 1984). Specific site descriptions for each transect will await on site finalisations during a one week induction period so practical difficulties are not overlooked. However general regions have been considered; for the night surveys the established monitoring MAYAMON site at Millionario pond is ideal, for transects representative sites for the area will be taken incorporating runs away from river banks and across physical depressions. Please see attached copy of OS map for proposed sites.

## Overview map



## Methods

### - *Procedure:*

On a temporal scale the surveying will be conducted over three circuits. Each circuit (two weeks) will consist of a survey of five transects. The transects will be surveyed in the same order during each circuit giving three repeats of each and enabling a comparison to be made of distributions with respect to the onset of the wet season (June – September) In between each circuit the night surveys are conducted, with two being completed each ‘changeover’ resulting in six in total

The project will be conducted under four ‘sub sections’ each co-ordinated by an individual member of the team;

### 1) **Surveying of non-vocalising ground dwelling species (namely *Eleutherodactylus* spp.)** – Co-ordinated by Toby Gardner

**Procedure;** The surveys will be conducted over a temporal framework of 6 weeks. Five transects are to be monitored during the first two week period – during the two subsequent periods the same transects will be monitored in the same order to achieve some understanding of changing species assemblages as the wet season progresses.

**Sites;** To obtain a clear idea of the area under consideration a copy of an OS map is attached. Acknowledging the inevitable on-sight adjustments noted above the following will provide a representative picture of local anuran distribution. Please note that expert advice is being obtained from the Natural History Museum and the

Forestry department with respect to appropriate exact locations. River – a transect running parallel to the river (91 49); two perpendicular to the river – 85 47 (nr Los Liros) and 88 48 (nr San Pastor). Two altitudinal gradients are proposed – 85 52 (away from main path) and 83 50, again away from path.

**Design;** Transects each of 200m in length (marked visually and position noted using GPS). Along each transect (of about 200m) will be 5 quadrats (10m x 10m) at randomly selected intervals, randomly distributed away from baseline (up to 10m departure). Two survey methods will be conducted at each quadrant point for comparison.

*Visual Encounter Surveys (VES)* – this is one of the most extensively used methods for relatively reliable assessments of forest areas. It is suitable to record species richness and relative abundance within an assemblage. It involves walking in concentric circles into the centre of the square whilst observing numbers and diversity and position of anurans. It is time constrained and conducted over x number of man-hours of searching, time spent surveying per unit area is standardised. One observer remains outside the quadrant to ensure that any escaping disturbed amphibians are accounted for. Sampling will occur during early and late hours of each day.

*A drift fence – trap array* will be set up for sampling, a more suitable method for determining relative abundance – this consists of a corrugated plastic fence (10m) running along the ground under which a number of greased buckets are sunk until rims are flush with ground level. The buckets can be assessed at dusk and dawn as to numbers and diversity of anurans captured.

Identification; This will be carried out using appropriate guides (Meyer & Foster, 1996; Campbell 1988). In event of indecision a photograph will always be taken using an SLR camera incorporating a macro lens. Local advice can also be sought from resident scientists at LCRS – a major benefit in the location

## **2) Surveys of the abiotic environment at each transect site – Co-ordinated by Emily Fitzherbert**

Analysis of environmental variables is particularly relevant to amphibian studies owing to their extreme skin sensitivity and dependence on moisture

The following variables will be measured – including time and GPS positioning

- Relative humidity – using a hand held thermohygrometer
- Ambient temperature
- Substrate moisture (tensiometer)
- Estimate of litter depth
- A summary weather report including time since last rainfall
- Maximum and minimum temperatures will be measured daily at each transect

Microhabitat assessment

- horizontal position, ie nearness of stream/pond
- vertical position, ie basic substrate type, exposure of soil
- special observations which could be potentially influencing ie local ant nest

Regional weather data can be obtained from the station at LCRS – rainfall, barometric pressure and maximum and minimum temperature recordings.

The above compilation follows standard amphibian survey protocol (ie Heyer et al 1996)

## **3) Surveys of the biotic environment at each transect site – Co-ordinated by Lorraine Williams**

Amphibians can display remarkably small foraging ranges, often considerably smaller than a single acre (Beebee 1996). As such an evaluation of key floral species present could provide a valuable insight into any habitat preferences.

Within each 10m<sup>2</sup> quadrat the following will be identified;

- The aboreal species over 20cm dbh
- The dominant (if any) herb and shrub layer cover

Two of the proposed transect sites lie within demarked study plots – the product of a collaborative effort between the Natural History Museum, University of Edinburgh (Geography) and Belize Bio-diversity Programme –Forestry Dept (see Bird 1998). Detailed GIS reports are available for these sites showing key vegetation and substrate types, which will be excellent reference data for our results. In addition to advice available from resident scientists the Las Cuevas station holds a number of books and a preserved herbarium for identification of problematic specimens.

Training in identification is being sought prior to departure at workshops hosted by the Natural History Museum (NHM). Knowledgeable advice is being gained from correspondence with Dr Sutton (Botany NHM), and Professor Blackmore (RBG Edinburgh).

#### **4) Monitoring of vocalising species at breeding sites – Co-ordinated by Nick Hill**

Owing to the labour involved there is a dearth and subsequent urgent need for data on the composition and dynamics of nocturnal species assemblages at breeding pools.

Monitoring protocol will follow (with additions) that of the IUCN's programme for the Maya region to allow for reliable comparison.

**Site;** The site for study will be the pond at the Mayan ruin, Millonario (858 535) – an recognised breeding ground for many species

**Procedure;** In light of the intensive nature of this work only 6 surveys will be conducted – these will take place between the transect survey circuit periods.

**Design;** One survey will be conducted over night using a Sony personal recorder. Recordings are made every hour for a period of 15 minutes.

Species are assigned to ordinal vocalisation categories (A=1-5 individuals, B=6-20, C=21-50, D=>50). Identification is made with reference to tapes held in at the Belize Foundation for Research and Environmental Education (BRFEE). Copies will arrive in Edinburgh two months prior to departure for familiarisation. Furthermore, links have been made with the acoustics group in the physics department at Edinburgh for rapid species analysis.

This data will provide valuable information on the presence and abundance of many vocalising species alongside assessing any changes in species prominence over night and also over the period July – September (gradual onset of the wet season)

A period of one week has been set aside at the end of the monitoring period to analyse data whilst the facilities and expertise available at LCRS are still available.

The above methods were compiled with reference to Bennet (1999), Heyer (1994), and DAPTF – MAYAMON protocols. Advice was obtained from consultation with John Wilkinson and Jack Meyer of the DAPTF and Peter Stafford and Chris Minty of the Natural History Museum.

## Itinerary

| Pre – Expedition    | Month                                   | Description   |
|---------------------|---|---|
| Field Stage (Brief) | Dec<br>Jan + Term 2                     | <ul style="list-style-type: none"> <li>- Commence sponsorship campaign</li> <li>- Commence inoculation programme</li> <li>- Open bank account</li> <li>- Commence publicity campaign</li> <li>- Spanish courses start</li> <li>- Start general familiarisation of literature / keys / trips to botanical gardens to observe flora</li> <li>- Medical training starts with Red Cross – Monday evenings</li> <li>- Continued correspondence with UCB</li> </ul> |
|                     | Easter                                  | <ul style="list-style-type: none"> <li>- Amphibian handling practice and field trials of methods weekend (DAPT)</li> <li>- LSTS survival course (5 days)</li> <li>- Purchase / order of specialist equipment</li> </ul>   |
|                     | Term 3                                  | <ul style="list-style-type: none"> <li>- Website design</li> <li>- Final preparations</li> </ul>  |
|                     | Departure<br>Week 1                     | <ul style="list-style-type: none"> <li>- Around 10<sup>th</sup> July</li> <li>- Acclimatisation, 2 day survival course + jungle familiarisation, identification practice + site location</li> </ul>   |
|                     | Weeks 2-3                               | <ul style="list-style-type: none"> <li>- Surveying Circuit 1 + 1<sup>st</sup> night surveys – nb, each circuit will contain two rest days – one at the end of each week</li> </ul>  |
|                     | Weeks 4-5                               | <ul style="list-style-type: none"> <li>- Surveying Circuit 2 + 2<sup>nd</sup> night surveys</li> </ul>  |
|                     | Weeks 6-7                               | <ul style="list-style-type: none"> <li>- Surveying Circuit 3 + final night surveys</li> </ul>   |
|                     | Week 8                                  | <ul style="list-style-type: none"> <li>- Consolidation of data and rest</li> </ul>  |
| Post Expedition     | End Oct<br>Oct 00 – Jan 01<br>Summer 01 | <ul style="list-style-type: none"> <li>- Pre-lim report completed</li> <li>- Lectures to sponsors and interested parties</li> <li>- Final report published + distributed</li> </ul>   |

## Risk Assessment

An expedition to a remote region of tropical jungle can be associated with many real health and safety risks. This section outlines the risks, necessary precautions and avoidance measures alongside emergency contingencies.

**Health** : (Belize is a relatively disease free country with no vaccination requirements by law but the following require precautions and avoidance measures)

Vaccinations and preventative medicine and avoidance measures applicable to Belize

- Rabies; A course of 3 doses over one month will be administered prior to departure – to be completed before commencement of anti-malarial drugs
- Hepatitis B; Full course of 3 injections over 6 months prior to departure to commence in January
- Malaria; Belize is not a high-risk area removing the necessity for drugs such as Mefloquine. However, the risk is a definite threat and a course of chloroquine will be taken commencing 1 week prior to departure. Preventative measures will

be taken to reduce chance of a bite, to include; sleeping under small mesh (needed to prevent penetration by sandflies) nets soaked in repellent – premethrin, long leg/sleeved clothing to be worn after dusk – also loose to reduce chance of biting through cloth, use of DEET based repellent.

- Childhood vaccines – tetanus, polio, diphtheria and Hep A all to be boosted as necessary
- Typhoid vaccination. Care to be taken in basic hygiene procedures
- Dengee Fever; a disease spread by mosquitoes. No available vaccine – precautionary measures noted above to be taken
- Leishmaniasis; skin disease caused by parasites carried in sandflies. Above bite avoidance measures applicable, thin mesh size on nets (above). To seek medical help (see later) if abnormal skin lesions appear.
- Fulariasis – a disease caused by thread worms spread by insect bites – precautionary measures above
- Chagas disease; a late onset neurodegenerative disorder transmitted by Assassin bugs. No known vaccine or cure – avoided by bite precaution measures above.
- River Blindness; rare but possible in Belize. Passed by a blackfly vector found near fast flowing water – above precautionary measures.

### ***Snake Bites :***

Familiarisation of all venomous snakes will be undertaken before departure and during a 2 day safety and survival course on arrival at LCRS (Las Cuevas Research Station). Those species noted for observation are: Ground dwelling pit vipers; *Bothrops asper*, *Atropoides nummifer*, and *Porthidium nasutum*, rattlesnake *Crotalus durissus* are all easily camouflaged on forest floor, sturdy booted footwear is needed. The tree dwelling species *Bothriedhis schlegelii* needs careful note in low branches and shrubbery. Coral snakes *Micrurus* spp. are brightly coloured but demand careful consideration.

- General precautions; Full clothing to be worn in dense undergrowth, ditches caves and root cavities to be treated with special care, to always carry a torch at night.
- In event of emergency; only in extreme circumstances will anti – venom be administered by unqualified persons – to avoid dangerous shock responses (the procedure detailed in the LCRS health and safety document will be memorised by all members). However, a supply of anti-venom available from LCRS will be carried at all times in the group medical kit. Reference to A Guide to the Reptiles of Belize available at LCRS for familiarisation to occurrence and precaution.
- Emergency evacuation will be undertaken if necessary – see emergency procedure and cover.

### ***Other animals:***

There are a number of other possibly dangerous animals such as the jaguar and wild pig which the group will become familiar with measures to identify and prevent disturbance.

### ***Medical Kits:***

Each individual will carry a personal medical kit (plasters, disinfectant, bandages, diarolite, insect repellent – deet based – anti histamine tablets, paracetamol, suncream, NHM guide to snake bites, whistle, torch). The group will hold a more comprehensive kit supplied by BCB. Furthermore an extensive camp kit is held at LCRS and the Station Manager Chris Minty is a qualified first-aider familiar with its use.

***Medical Training:***

Emily Fitzherbert is a qualified first aider. All other members will attend a Red Cross standard first aid course in the spring. Moreover, one member will attend a more advanced course in addition to attendance at the RGS field risk assessment workshop on the 23<sup>rd</sup> March 2000. All members will be familiar with the NHM field safety manual available from NHM.

***Hygiene:***

- Water; water supply at LCRS comes from a cave system and is quite drinkable. During phases away from LCRS Iodine will be used to purify which is deemed sufficient without the additional need to filter. Dehydration is acknowledged as a problem and care will be taken to take at least 4 litres per day with salts available at all times
- Latrines; during phases away from LCRS care will be taken to dig appropriate pits with disinfectant available for hand washing.
- Food; treated water to be used in all cooking. Supplies kept sealed and off the ground during storage. All waste buried or burnt.

***Field Safety:***

Sensible measures to be taken whilst surveying in field; no forays into jungle unaccompanied, emergency packs and radio carried at all times, large scale map and compass to be carried at all times. One of the largest causes of fatality in the tropics is falling of dead timber, care will be taken in observing canopy whilst trekking and laying camp.

***Transport:***

Care to be taken whilst in transit to LCRS before and after expedition. Weather reports to be obtained prior to departure. If hiring vehicle then standard FLOWERR checks will be made before moving. Consideration of poor driving standards whilst in transit.

***Political situation and climate:***

The political situation in Belize is stable and not a cause for concern. Hot and humid climate with temperatures averaging 25 during the day and as low as 5 at night – see above for dehydration precautions. During period of stay cyclones and hurricanes are not uncommon and weather reports will be listened to regularly for early warning.

***Insurance cover:***

The relevant cover will include: early curtailment – return flight to UK, medical expenses incorporating search and rescue (£2,000,000), hospital benefit (£300), legal liability.

***Emergency contingency:***

The group is covered by insurance for medical evacuation, early return to UK and foreign treatment costs. A VHF radio available from LCRS will be carried at all times. The procedure in emergency follows: (1) Administer first aid if feasible (2) To return to LCRS with patient if practical (3) To inform LCRS station manager immediately line of contact if no reply – 25 Flt Army Corp on GMP 2000 satellite phone at LCRS, Belize Communications Ltd (Channel 7 or 8), British High

Commission (Channel 6), Forest Dept Belize (Channel 2). Evacuation will commence depending on severity Luma Luz hospital (3 hours by road) in Santa Elana or Belmopan hospital. Air evacuation (24 hour cover) time to Belize Medical Associates, Belize City is 30min. A 2 hour flight can reach Houston hospital in the USA.

The above was complied with help by; Professor Warrell (Oxford Centre for Tropical Medicine), Dr Tim Brown (Ed University Health Service) and Chris Minty (station manager at LCRS). Reference to texts; RGS Expedition Medicine by D.Warrell & S.Anderson, Tropical Forest Expeditions by C.Jeremy & R.Chapman, University Health Service documents, LCRS Health and Safety document. A copy of a recent risk assessment by Dr Sutton of NHM

### **Team Members**

#### **Emily Fitzherbert (22)**

*Role; Fundraising Co-ordinator & Chief Medical Officer*

Emily is a third year Biological Science student at Edinburgh University looking to honours in zoology or ecology. She has a great deal of field work experience both at home and abroad. Two summers as a research assistant with the Yellowstone National Park Wolf Project in addition to being a surveying co-ordinator for the sea turtle protection society of Greece. She is a qualified first aider having worked as a Training Assistant for the Cumbrian Red Cross. She is an enthusiastic member of the Ecological Society committee and has a keen interest in all conservation matters. Her extensive experience of planning and fundraising past ventures in addition her natural dedication make Emily an ideal candidate for the team.

#### **Toby Gardner (21)**

*Role; Project Co-ordinator*

Toby is presently a third year zoology student at Edinburgh University. He has experience of expedition planning gained from conservation and community work on a Raleigh International expedition to Uganda. Work for 7 months as an assistant warden in Ambleside YHA and 2 summers as a water-sports instructor both in Scotland and Greece has given Toby experience of logistics, safety and management skills. He is a very keen ecologist and is secretary of the Ecological Society responsible for the weekly organisation and running of events. Further leadership ability is reflected in his position as Treasurer of the university Windsurfing club, where he also regularly teaches students. Planning an expedition has long been his ambition and his enthusiasm and natural leadership abilities make him a dedicated member of the team.

#### **Nicholas AO Hill (20)**

*Role; Scientific Research and International Liaison Officer*

Nick is a second year Zoology student at Edinburgh University. After completing his A levels Nicholas completed an intensive course in water sports instruction with the United Kingdom Sailing Academy, a course which endowed him with not only the ability to teach sailing, windsurfing and diving but in-depth safety training and 1<sup>st</sup> Aid (1<sup>st</sup> Aid at Sea) in addition to essential teamwork skills. Following this Nicholas spent 3 months in Belize with Coral Cay Conservation as a research volunteer. His position of Assistant Science Officer on the expedition included leading survey dives

on the reef and the collection and analysis of data produced. He also worked alongside students from University College Belize giving him an excellent insight into education and the student community in Belize. The above experience and Nicholas' passion for conservation work make him a valuable team member.

### **Lorraine Williams (22)**

*Role; Logistics Officer*

Lorraine is a third year Biological Science student at Edinburgh University. She has a great deal of experience in organisation and work in challenging conditions. After leaving college she worked for 6 months as an English language teacher in India responsible for the daily planning and organisation of lessons. Following that she worked under Bunac Work America selling fruit and in the most recent vacation was a integral part of organising and conducting a HELP construction project in Tanzania. She has an enthusiastic attitude towards biology reflected in work as science co-ordinator for the Edinburgh Science Festival and a hand in preparing for Symbiose 2000. Her excellent organisational ability and commitment to work make Lorraine a definite asset to the team.

### **Belize members**

Project Anuran will comprise the four Edinburgh students (as detailed above) and two students from the University College of Belize (UCB) in Belmopan. The inclusion of native ecology students in our work will play an integral part both in benefiting the project during the proposed period of study but also in establishing close ties for any future such projects. Confirmation has been received from UCB confirming their enthusiasm for the project (see attached letter) and suitable applicants are being chosen at present (to be known before April). Once established our counterparts will be fully involved in prior preparations, on-site training and post study analysis, in addition to the six weeks of fieldwork.

*Future prospects;* It is hoped that the ground work laid down by Project Anuran will provide the infrastructure necessary for repeat work to be conducted in the future. From a scientific viewpoint the study would benefit enormously from repeated work considering changes in population distribution over future generations and contribute further to the important work of the IUCN group Declining Amphibian Population Task Force who are working in the area. Furthermore the project has great potential to provide an opportunity for similar future collaboration with students both of Edinburgh and Belize.

### **Budget**

This is inclusive of the four Edinburgh members and expenses for the Belize students.

|                      | <b>Type</b>                                  | <b>£ per person</b> | <b>£ per group</b> |
|----------------------|--|---------------------|--------------------|
| <b>Pre-departure</b> | Flights <sup>1</sup>                         | 500                 | 2000               |
|                      | Tax  | 50                  | 200                |
|                      | Accommodation <sup>2</sup><br>6 weeks tented | 100                 | 600                |

<sup>1</sup> As per BA via Cancun as the cheapest option

|                                   |                                       |           |      |
|-----------------------------------|---------------------------------------|-----------|------|
|                                   | 2 weeks bunk house                    | 100       | 600  |
|                                   | Photographic equipment and film       |           | 500  |
|                                   | Books and Maps                        |           | 325  |
|                                   | Affiliation                           |           | 40   |
|                                   | Training Medical <sup>3</sup>         | 50        | 200  |
|                                   | Risk Assessment                       | 25        | 25   |
|                                   | Monitoring workshop                   | 10x3 = 30 | 120  |
|                                   | Medical Vaccinations + anti malarials |           | 175  |
|                                   | First Aid Kits                        |           | 100  |
|                                   | Equipment                             |           | 500  |
|                                   | Administration                        |           | 100  |
| <b>In Field</b>                   | Food                                  |           |      |
|                                   | 7 weeks self catered                  | 200       | 1200 |
|                                   | 1 week catered                        | 50        | 300  |
|                                   | Research permit                       |           | 75   |
|                                   | Station bench fees                    |           | 150  |
|                                   | Guide hire                            |           | 110  |
|                                   | In country travel                     |           | 200  |
|                                   | Fuel                                  |           | 200  |
| <b>Post expedition</b>            | Report printing and distribution      |           | 400  |
|                                   | Photographic development              |           | 150  |
| <b>Total</b>                      |                                       |           | 8270 |
| <b>10% contingency</b>            |                                       |           | 827  |
| <b>Total</b>                      |                                       |           | 9097 |
| <b>Funds acquired to date</b>     |                                       |           | 5800 |
| <b>Less personal contribution</b> |                                       | 400       | 1600 |
| <b>Target remaining</b>           |                                       |           | 1697 |

**Fundraising ;** In addition to this application the following have been applied to in order to help raise the necessary funds;  
British Ecological Society (received), Carnegie Trust, Edinburgh Trust No. 2, Explorers Club, Gilchrist Educational Fund, Albert Reckitt charitable trust, RGS, RSGS, Shell Bursaries, Wilderness Awards, Davis Expedition Trust, Small Projects Grants (Edinburgh), Weir Fund, James Rennie Bequest (received), Student Travel

<sup>2</sup> As per LCRS costing Dec 99 – includes facility use at the station, safety and logistical cover

<sup>3</sup> As per Red Cross incl. Tropical first aid at the RGS

Fund, William Churchill Memorial Trust, Society for the study of amphibians and reptiles, Conservation and Research Foundation.

In addition to the above is personal contributions and the commercial sponsorship campaign (in particular those companies with an interest in Belize or past interest in British Honduras)

### **Project Output**

- 1) A preliminary report will be made within one month of return
- 2) A full and detailed report will be compiled within one year of return

Both reports will be submitted to all financial supporters in addition to interested parties and host country organisations (see b)

A website will also be produced. Construction will be before departure to enable regular updates to be uploaded whilst in field. The team will have periodic access to computer facilities at LCRS and UCB for in field analysis and progress reports.

A series of talks will be given on return on both the scientific and logistical aspects of the expedition, recipients will include; University Ecology, Zoology and Geographical Societies; interested sponsors and organisations (Sept – Dec)

The team hope to produce a paper in a scientific journal – namely Journal of Herpetology or Herpetological Review describing the distribution of anuran fauna in this understudied area (within one year)

### **b)**

The final report will be completed within one year of return (summer 2001) this will allow time for a comprehensive output since  $\frac{3}{4}$  of UK members will be in their final year.

Recipient organisations and authorities will include;

- Declining Amphibian Population Task Force of the IUCN
- Zoology Department of the Natural History Museum
- Forestry Department of Belize
- University College of Belize
- Belize Biodiversity Programme (WCS)
- Belize Audubon Society
- University of Edinburgh
- British Herpetological Society
- World Wide Fund for Nature
- Royal Geographic Society
- Royal Geographic Society of Scotland

### **Contacts**

The following have provided helpful information and ideas used in the compilation of this proposal;

Dr David Sutton (NHM, London), Dr Peter Stafford (NHM, London), Professor Bob Allison (Geography Dept, Univ. Durham), Professor David Warrell (Centre for

Tropical Medicine, Oxford), Major Alisdair Rogers (Leader of a number of joint services Expeditions to Belize), Adriana Dinu (International Co-ordinator, Global Conservation Alliance), Chris Minty (Station Manager, LCRS), Dr Sandy Knapp (Project Leader, LCRS – London), John Wilkinson (International Co-ordinator DAPTF), Dr Jack Meyer (Chair of DAPTF working group for Belize), Professor Peter Furley (Geography Dept. Univ. Edinburgh), Dr Graham Russel (IERM, Univ. Edinburgh), Dr Tim Brown (Univ. Health Services), Sharon Matola (Director, Belize Zoo), Pio Saqui (University College Belize), Dr Joseph Iyo (University College Belize), Anna Hoare (St. John's College), Ivan Scales (Rainforest Foundation), Rosie Trevalyn (Director, Tropical Biology Association)

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## **Statements of Support attached**

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**Websites :** the below were of use and interest to the project

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- <http://acs-info.open.ac.uk/info/newsletters/FROGLOG.html> 1998 DAPTF field code of practice
- [http://fwie.fw.vt.edu/mayamon/maya\\_home.html](http://fwie.fw.vt.edu/mayamon/maya_home.html) - MAYAMON
- <http://www.mplpwrc.usgs.gov/amphibs.html> - North American Amphibian Monitoring Project
- <http://www.ukans.edu/~ssar> - Society for the Study of Amphibians and Reptiles
- <http://www.ucb.edu.bz/contact/html> - Belize University College