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REPORT ON BHS CAPTIVE BREEDING AND CONSERVATION PROJECT WORK: SUMMARY 2019 – 2020

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Mantella aurantiaca in Madagascar
Photo: Richard Griffiths

Report on BHS Captive Breeding and Conservation Project work: Summary 2019-2020

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This report provides an update on captive breeding and conservation activities, particularly meetings and current/recent applied project work. The programme of project work was established over twenty years ago (see Townson, 1999) and has been supported largely by independently raised funds. This small grants scheme has progressed in a somewhat *ad hoc* manner, typically awarding small grants of £1000; although we recognise this is only a small amount, it can nevertheless achieve much in developing countries, or make a significant impact when combined with larger grants from elsewhere. We have also seen that these grants can be important for young herpetologists involved in the initiation of conservation ideas/projects.

To see reports/updates on some earlier funded project work, please refer to Townson (2018) [includes Agile Frog update; *Mantella cowani*; Gharial conservation in Nepal]. Townson (2014) [includes Golden Mantella; Veterinary workshop in Kenya; Belalanda Chameleon; Cayman Iguana; Agile Frog]. Liddiard (2017) [Agile Frog in Jersey]; Burton (2010) [Captive breeding and conservation of the Cayman Island Iguana, *Cyclura lewisi]*. Buley and Villavicencio (2000) [Captive breeding and conservation of the Mallorcan Midwife Toad].

Amersham Meeting 2019

The annual Amersham meeting, in collaboration with the Thames and Chiltern Herpetological Group, took place on Sunday 8 September, 2019 and was a great success with the feedback all positive. The meeting was well attended, with excellent presentations and lively discussions. These meetings usually attract a diverse audience, including professional scientists, zoo people, fieldworkers, amateurs, and junior members. The dominant theme was conservation management and monitoring, with the four presentations divided between UK and overseas (tropical) research. We encourage recipients of BHS grants to present their work at these meetings, and this year there were two such presentations. 1. The presentation by Karen Haysom from the Amphibian and Reptile Conservation Trust focused on the ambitious captive tadpole head-starting and release programme for the UK Pool Frog (*Pelophylax* lessonae) in Norfolk, and 2. The presentation by Matthew Rendle gave us an insight into the complexities of conservation management of the Indian Python in Gujarat, India.

The abstracts for the meeting presentations are as follows:

The UK Northern Pool Frog *Pelophylax lessonae* Reintroduction: Head-Starting Tadpoles for Release

Karen Haysom, Yvette Martin & Jim Foster
Amphibian and Reptile Conservation Trust, UK.

Summary of a talk delivered at British Herpetological Society and Thames & Chiltern Herpetological Group Joint meeting, Sunday 8th September 2019.

The pool frog *Pelophylax lessonae* is the UK's rarest amphibian. Pool frogs are a

"water frog" species, with other members of the group including the marsh frog *Pelophylax ridibundus* and edible frog *Pelophylax esculentus*. While southern pool frogs occur throughout a large region of central, southern and eastern Europe into Russia, the northern clade of this species is much more restricted with small populations known only from UK, Norway, Sweden, Finland and Estonia. For a long time it had been assumed that the pool frogs recorded in East Anglia were a non-native species, but studies of their genetics, calls and historic records established that they were indeed native to Britain and part of this rare northern clade. Tragically, however, the English population was driven to extinction by 1995, partly as a result of agricultural management practices such as land drainage.

In 2005, ARC produced a reintroduction strategy to guide species recovery efforts; this was aligned closely to internationally recognised standards of best practice for reintroductions. Between 2005 and 2008, ARC worked in partnership with Natural England to reintroduce the species to its first UK reintroduction site, using a wild to wild translocation of tadpoles, juveniles and adults that were collected under special licence from Sweden. While still a small population, there has been growth over time. In 2015 it was used as the source of individuals for a further translocation to a second UK site, Thompson Common, a Norfolk Wildlife Trust reserve that is also the location where, before their extinction, the last native pool frogs were known.

Owing to their very small size, and slow growth, populations at both sites remain very vulnerable to climatic events or the introduction of a disease that could once again cause them to be lost from the UK. For this reason, ARC has been fund-raising to establish a biosecure "head-starting" facility. In 2019, with financial support from BHS and other funders, we were able to set up a facility to give pool frogs a "head start". Inside the facility, we hatched wild-caught spawn and grew tadpoles through the smallest and riskiest stages of their life-cycle, when in the wild a high proportion would be lost to predators and other causes. The strategy is to release large tadpoles just before they develop their front legs, when they are much less vulnerable to predation. We released two batches of tadpoles to Thompson Common this summer. We hope this process will help to fast-track the expansion of the second population and ultimately help us spread pool frogs to other suitable sites across their native East Anglia.

We thank BHS for a donation that enabled us to buy rearing tanks and other equipment for the facility. The pool frog is a partnership project that receives advice from a panel of experts, the Pool Frog Working Group and funding and in-kind support from Natural England, Forestry Commission, Anglian Water, London Zoo, Institute of Zoology, Amphibian Ark, Anglian Water Flourishing Environment Fund and other generous donors.

Figure 1. Internal view of the established head-starting facility showing tanks and associated equipment. Each tank has its own unique set of equipment, one of the many measures taken to maintain biosecurity. Photo Alice Pawlik/ARC.

Figure 2. Growth of the tadpoles is monitored throughout the project. Each week representative tadpoles from each tank are photographed above a 1cm grid. This image shows tadpoles with well-developed hind legs, just before their release to the wild. Photo Yvette Martin/ARC

Figure 3. Release of head-started tadpoles at the reintroduction site at Thompson Common, a Norfolk Wildlife Trust reserve. Photo ARC.

Conservation Management of the Indian Python (*Python molurus molurus*) in Gujarat, India.

Matthew Rendle, Soham Mukherjee, and Brinky Desai
Wildlife Vets International

The Indian Python (P*ython molurus molurus*) is a CITES Appendix 1 endangered species. The population in the state Gujarat is on an area of agricultural land, isolated by approximately 100km distance from any other populations. Due to its isolation and the unpredictability of the likelihood of farm land being developed for housing this population must be considered at risk. The farmland is mostly flat with very little cover or refugia for the pythons with the exception of numerous (several hundred) concreate drainage pipes that link the fields of crops. Previous student studies of this population estimate it to be around 500 animals, but the number of clay drainage pipes used for nesting and shelter is very low (less than 30), which has to be considered a possible restriction on the python population growing or maintaining it's current levels.

In this study with the help of a group of Indian herpetology/biology students we gathered data on the drainage pipes that are used and unused; we measured UVB, temperature, and position (direction opening faces and position logged with GPS) in correlation with environmental resources such as water. The aim of gathering and analysing this data was to try and enhance the unused drainage pipes to encourage the pythons to use them. The data was gathered and has undergone statistical analysis and is in the process of being written up for publication.

One of the great challenges we face is to enable peaceful co-existence between this large reptile and the local human population.

This study was funded by a BHS grant.

Figure 1. Python resting at edge of hole; local habitat/field scene; searching for pythons in drainage pipe; collecting environmental data around and inside python hole.

Snakes in the Clouds: Assessing the Cloud Forest Snake Community of Cusuco National Park, Honduras

George Lonsdale
Centre for Applied Zoology, Cornwall College Newquay, UK.

Cusuco National Park, Honduras, is one of the most important protected sites worldwide for biodiversity due to having such a high diversity of micro-endemic herpetofauna. Despite its importance, Cusuco also represents one of the most threatened ecosystems in Honduras; with vast swathes of even the most protected pristine core zone being deforested for agriculture. Not only important for its fauna, Cusuco is home to globally rare forest types such as Central American Pine/Oak forest, Cloud Forest and the almost mythical Bosque Enano, the Dwarf Forest. These forest ecosystems are limited in range by climatic factors which have changed in accordance with global climate change. As the forests change in these ways so too does the community of animals they can support, many of which have evolved micro-niches specific to these forests. Studying how these anthropogenic pressures affect the communities of animals that can persist there, could be vital in understanding how biodiversity will be affected on a global scale and could provide evidence to be presented to the Honduran government on the necessity of further protection of these incredible areas.

Snakes, overall, are a particularly robust group of animals that persist in almost every habitat on earth. However, under extreme conditions, for example in Cloud Forests, they occur in discrete niches which are often separated by temperatures, activity periods, food sources and prey abundance. When these forests undergo

habitat loss and the ecosystems change, often these niches get lost or significantly change over space and time. When this happens, snakes become a perfect model taxon for studying the faunal response to these threats.

Using an established network of transects throughout Cusuco, we have monitored the changes to herpetofauna biodiversity over time. Coupling that with knowledge and satellite images of where the most aggressive deforestation has occurred, shows us stark declines in species richness and homogenisation of the snake community. Pristine forest tended to have a high diversity of snake species representing a high number of ecology trait groups. Whereas, disturbed forests showed a decline species richness and abundance, and a loss of most major ecological trait groups including leaf litter snakes and Pit Vipers, likely due to a lack of suitable habitat. The findings of this research will help us to understand the species specific and taxa specific responses to this rapidly changing forest.

Figure 1. *Leptophis ahaetulla*.

Figure 2. *Scaphiodontophis annulatus*.

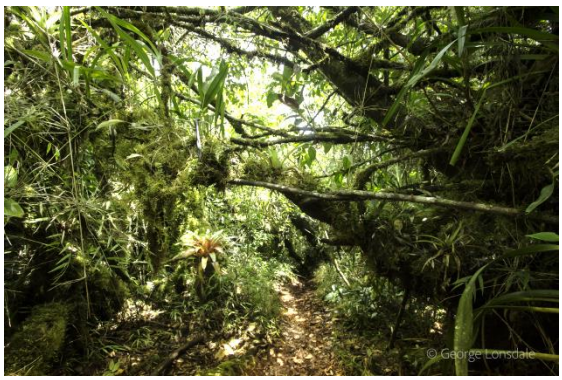

Figure 3. Typical scene from the Dwarf Forest, Cusuco.

Figure 4. Telemetry equipment used for tracking the movements of the forest snakes.

Movement Patterns and Refuge use by Slow-Worms

Louise Masters, Richard A. Griffiths, Deborah J. Fogell
Durrell Institute of Conservation and Ecology, School of Anthropology and Conservation, University of Kent, Canterbury, Kent, CT2 7NR, UK.

The slow-worm, *Anguis fragilis* is a semi-fossorial temperate legless lizard in the family Anguidae. The species is widespread throughout the United Kingdom (UK) and Europe and is assessed as Least Concern on the IUCN Red List. It is protected in some European countries including the UK but is declining in parts of its range, mainly due to habitat degradation as a result of urban development and agricultural intensification. In the UK any land destined for development encompassing suitable reptile habitat must be surveyed as a precursor to obtaining planning permission and appropriate actions taken to reduce the impacts on the animals present. However, obtaining reliable population assessments for reptiles is difficult due to their cryptic behaviour which often depends on local conditions. In addition, surveys are not currently standardised resulting in unreliable assessments of national trends and questionable outcomes for mitigation strategies such as translocation. We assessed the effects of survey and environmental covariates on the numbers of slow-worms observed under cover objects at a site in Kent, UK. We surveyed the site every 2 to 8 days between April and July 2019 in a range of weather conditions. Surveys were conducted by

Figure 1. Study site in Kent

walking a directed transect and using a paired artificial cover object (ACO) design consisting of 12 felts and 12 tins which were checked in the same order during each survey.

Figure 2. Female slow-worm found during a survey.

Data loggers were placed beneath each ACO and recorded the temperature beneath at hourly intervals throughout the study period. We found that variation in slow-worm numbers was significantly affected by ACO material and location, ACO temperature over the 24 hours prior to a survey, and rainfall. Most slow-worm detections occurred beneath felts, but detections also depended on the location of the ACO within the site. Using predictions based on the top model, we estimated the number of slow-worms that are likely to be found at each ACO type and location in a subsequent survey, allowing for future focussed survey effort. Temperature of ACOs in the 24 hours prior to a survey had a significant positive affect on slow-worm numbers and model fit declined with decreasing time since survey start, demonstrating that the conditions at increasing intervals prior to a survey may be a better indication of slow-worm numbers that those at the time of, or immediately prior to a survey. Wet ground had a significant negative effect on slow-worm numbers although this was likely highly influenced by complete absence of slow-worms at a single survey which took place in heavy rain. Our findings support suggestions that slow-worms use warmed refuges as heat sources for thermoregulation rather than obtaining heat directly from solar radiation. We recommend that standardised protocols are established in which paired ACO designs are used and account is taken of survey conditions in the 24 hours prior to conducting surveys. The methods used in this study may be applied to studies of other herpetofauna using ACO arrays to reduce detection bias and optimise survey design. Future studies will focus on movement patterns of slow-worms, using individual natural markings to conduct spatial capture-recapture analyses of slow-worms throughout 2018 and 2019.

Captive Breeding Committee funded project work.

Work has continued on a range of projects concerned with applied conservation and captive breeding.

Current projects:

UK Pool Frog Reintroduction Programme.

Amphibian and Reptile Conservation Trust (ARC), UK.

The Northern Pool Frog (*Pelophylax* lessonae) is the UK's rarest amphibian. It became functionally extinct in the UK in 1995, largely as a result of habitat loss and

deterioration. This northern clade of Pool Frog is now recognised in its native countries as a species of conservation concern. It is only found in a few isolated sites in Norway, around 200 sites in Sweden, and a few sites in Finland. For over a decade ARC has been working with partners in Norfolk to reintroduce pool frogs imported from Sweden. This initial phase has gone well, while part of the current work is to produce a dedicated head-starting facility to underpin population re-enforcement and to support translocations to further sites. This proposal to BHS is for a grant to enhance tadpole rearing facilities, and has been active during 2019.
Funding approved June 2018. Please see abstract (above) from the 2019 Amersham meeting.

Conservation of the Indian Python in Gujarat, India.

Matthew Rendle (Wheelhouse Vets, UK) and Soham Mukherjee (Jivdaya Charitable Trust, India).

The Indian Python (*Python molurus molurus*) is a CITES Appendix 1 endangered species. This project will seek to monitor and protect pythons through a programme of protecting and enhancing breeding sites (including artificial refugia), education and promotion with local peoples (mitigation of road kills and benefits to farmers etc.). This proposal is currently underway; please see abstract (above) from the 2019 Amersham meeting.
Funding approved June 2018.

Do Female Golden Mantella Frogs have a Preference for Captive or Wild Male Calls ? Implications for the Re-Introduction of Captive Amphibians.

Luiza Passos, (Liverpool John Moores University, UK).

The Golden Mantella frog (*Mantella aurantiaca*) is a critically endangered species, found only in Madagascar with a distribution restricted to a fragment of forest that is under severe threat from human activities. According to Amphibian Ark, *ex-situ* assistance is vital for the long-term survival of this species.
A previous study published by the PI has demonstrated that captive frogs had their calls modified by the captive acoustic environment. It seems that captive husbandry requirements of some amphibians may be more complex than first thought. Inappropriate conservation breeding programmes could potentially produce maladapted amphibians that are unsuitable for release. This project will aim to test if female frogs, both captive and wild, will show a preference for calls from wild or captive males. The project will also try to understand the consequences of calls modified by captivity on the breeding behaviour of Golden Mantellas.
Funding approved October 2018. Following a delayed start, fieldwork in Madagascar is underway January 2020.

Recently completed projects:

Headstarting of Agile Frog (*Rana dalmatina*) Tadpoles at the Durrell Wildlife Conservation Trust, Jersey.
Partners, BHS, Jersey Reptile and Amphibian Group, Amphibian and Reptile Conservation Trust, UK, and Durrell Wildlife Conservation Trust.

Microhabitat Selection and Behaviour of the Harlequin Mantella (*Mantella coweni*) in Madagascar.
Madagasikara Voakajy (Madagascar) and the Durrell Institute for Conservation and Ecology (University of Kent, UK).

Gharial Conservation in Nepal (Gharial Breeding Centre, Chitwan National Park, Nepal.)
Zoological Society of London (Regents Park, London, UK).

Conservation and Sustainable Utilization of the Golden Mantella Frog: Survey of Breeding Sites in Mangabe, Madagascar.
Madagasikira Voakajy (Madagascar).

New project proposals under development/consideration

Research on the Optimization of Tadpole Diets.

Collaboration between the Waltham Pet Centre for Pet Nutrition, the London Sealife Centre and the University of Derby.

The zoo conservation community is trying to establish healthy, viable *ex situ* populations of amphibian species which may become extinct in the next decade or so. However rearing and reproducing these amphibians in captivity can be challenging as little is known about the natural diet of many species of tadpole or their fundamental nutritional requirements. This project will seek to evaluate and optimize diets for a number of species in captivity.
It was intended for this project to go forward in 2018, but has been unexpectedly delayed by the maternity leave of the principal investigator Dr Donna Snelgrove at the Waltham Pet Centre (a MARS company). We remain hopeful that the scientific group of researchers involved with this important project will be able to go ahead and make a start sometime in 2020.

Captive Breeding Programme for the Harlequin Mantella (*Mantella cowani*).
Chester Zoo, UK.

Following the earlier BHS funded project to study the microhabitat selection and microclimate use of *Mantella cowani* in Madagascar, it is hoped that there will be an application for funding to contribute to a captive breeding programme for this critically endangered species.

Figure 1. *Mantella cowani* photographed in Madagascar (courtesy Richard Griffiths).

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