CONSERVATION LEADERSHIP PROGRAMME: FINAL REPORT

Saving the Critically Endangered Intermediate Puddle Frog in Ghana

Intermediate puddle frog (*Phrynobatrachus intermedius*)

This project aimed at saving the critically endangered Intermediate puddle frog (*Phrynobatrachus intermedius*) from extinction

CLP project ID: 01119920
(*Field Period: Sept. 2020 to Aug. 2021*)

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Table of Contents

Project Partners & Collaborators

Herp Conservation Ghana (Herp-Ghana)	Herp-Ghana is Ghana's first amphibian and reptile conservation society. Herp-Ghana was the main implementing partner of this project. Herp-Ghana has key collaborators in the study site that facilitated successful implementation of project activities.
Conservation Leadership Programme	Provided funding, training, and mentoring that allowed the project team to successfully conduct project activities.
Caleb Ofori-Boateng	Provided expert advice and guidance for our team during the project implementation.
Ghana Wildlife Division	Provided the necessary permits that allowed the project team to conduct research in the study site.
Richard Ofori Amanfo	Provided useful comments and advise for the research component of this project.
Community Members	Promoted conservation education in their respective communities.
Kwame Nkrumah University of Science and Technology	Students from the Faculty of Renewable Natural Resources were involved in monitoring of project outcomes.

Section 1

Summary

The intermediate puddle frog faces an imminent extinction threat due to continues decline in the quality of its habitat. The species is known from a single locality, the Ankasa Conservation Area in southwestern Ghana. The objectives of this project were to: 1) Determine the distribution of the intermediate puddle frog. 2) Determine the habitat preferences of the intermediate puddle frog and 3) Decrease the willingness of 1000 farmers and raffia palm dealers to engage in activities that threatens the survival of the target critically endangered species by 50%. Activities conducted to achieve project objectives include, field surveys, collection and analyzes of habitat data and conservation awareness in local communities. This first ecological study of Phrynobatrachus intermedius resulted in the rediscovery of the species after 12 years. Also, we recorded for the first time what we believe to be the male of the target species. Until now, Phrynobatrachus intermedius was only known from two adult females and one juvenile. In addition, we identified several new localities where the species occur within the Ankasa National Park that was previously unknown. Finally, our team increase conservation awareness and interest in the species through the community outreaches that were conducted. Future work must focus on the population size estimation of the target species for future monitoring, restoration of degraded sites within the reserve, as well as enhancing local capacity to effectively identify and manage the species to guarantee its long-term survival.

Introduction

The intermediate puddle frog (Phrynobatrachus intermedius) is a highly cryptic species endemic to Ghana. The intermediate puddle frog is one of Puddle frogs of the genus Phrynobatrachus diverged from all other living amphibians around 90 million years ago. This means they are as closely related to other frogs as humans are to rabbits, hares, rats, and squirrels! It is currently ranked the 32nd most genetically distinct and globally endangered amphibian in the world. It is listed as critically endangered on the basis of a rapidly declining forest habitat and has a known extent of occurrence (EOO) of around 48km² and appears to be highly localized within this area. The frog occurs in a single forest site in Ankasa Conservation Area.

The frog faces threats from continues decline in the quality of its habitat. The frog's habitat (forests) is under great pressure from the surrounding population, majority of who are living below the poverty line and rely on the forests for their livelihoods. As a result, forest fringe communities illegally extract raffia palm from the frog's riparian habitat, and this poses a significant threat to the survival of this critically endangered species. Worst, information required to make informed management decisions is non-existent. The projects objectives were (1) Determine the distribution of the intermediate puddle frog. (2) Determine the habitat preferences of the intermediate puddle frog and (3) Decrease the willingness of 1000 farmers and raffia palm dealers to engage in activities that threatens the survival of the target critically endangered species by 50%.

This project was implemented in the Ankasa Conservation Area. Geographically, the site falls along southwestern Ghana on the border with the Ivory Coast. The habitat consists of a typical tropical lowland forest cover, covering 509km2 and the site is part of Alliance for Zero Extinction sites and falls under category II of IUCN classification.

Herp-Ghana, an amphibian and reptile non-profit were key partners to this project. Herp-Ghana facilitated community entry and provided student volunteers who worked on this project. A number of local stakeholders including community leaders (Mr. Paul Mensah, Mr. Kwaku Darko and Mrs. Shalom Adjei) supported the project in various ways.

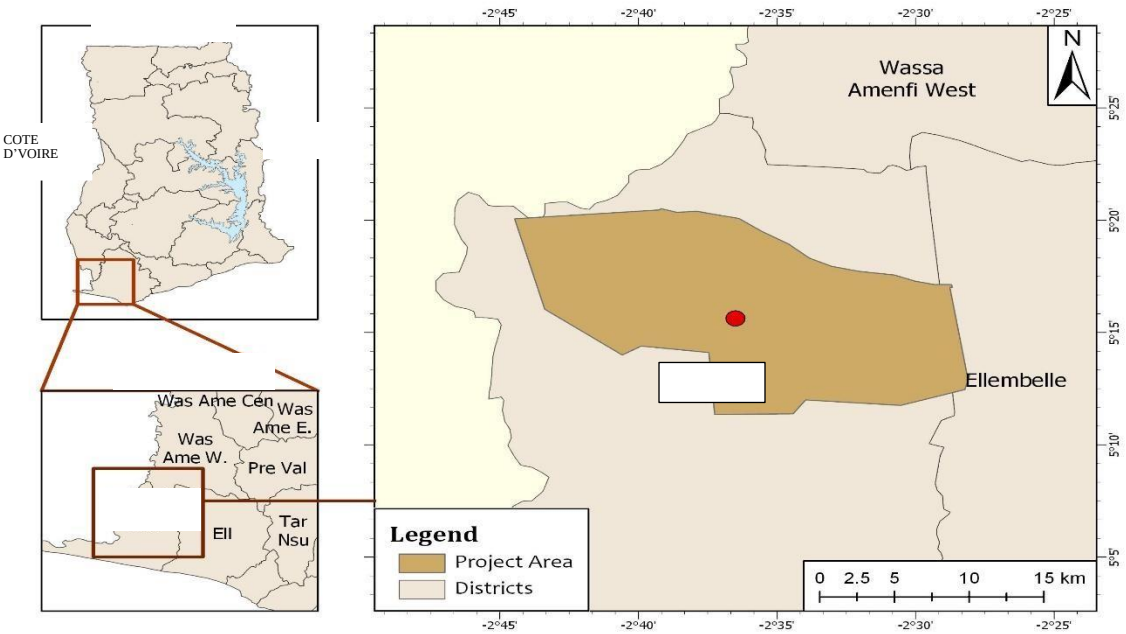


Fig. 1: Map of the project site (Ankasa).

Project Members

Photos of project members

Project Members were Francis Osei-Gyan (Team leader), Bernard Eshun (Species survey leader), Susana Akwele Aryeetey (Conservation education campaigns leader) and Angelina Osei Asor (Behavior change programs Leader).

Francis Osei-Gyan holds an MSc in Development Policy and Planning. He is a Research and Conservation Officer with Herp Conservation Ghana. Bernard Eshun holds a BSc in Natural Resource Management. He currently works as a Research Officer with Institute of Nature and Environmental Conservation (INEC Ghana). Susana Akwele Aryeetey holds a Bachelors in Sociology and Social Work. She is currently a human resource manager in an educational institution. Angelina Osei Asor holds an MA in Environmental Management and Policy. She is currently a fulltime lecturer at the Atebubu College of Education.

Section 2

Aim and objectives

The project aimed at improving knowledge on the Intermediate puddle frog for urgent conservation planning and reduce threats to the frog's survival. The specific project objectives were:

1. Determine the distribution of the intermediate puddle frog in southwestern Ghana.
2. Determine the habitat preferences of the intermediate puddle frog in southwestern Ghana.
3. Decrease the willingness of 1000 farmers and raffia palm dealers to engage in activities that threatens the survival of the critically endangered species by 50%.

Methodology

Objective 1: Determine the distribution of the intermediate puddle frog in southwestern Ghana.

Activities Conducted

Activity 1.1 Field Surveys: We conducted field surveys throughout the forest zone of southwestern Ghana. We used opportunistic visual and acoustic encounter survey techniques. Beginning our search from sites where the frog has previously been recorded, we expanded to other areas where suitable habitat types were observed. Specifically, we superimposed a 50×50m grid over the study site and randomly selected 40% of the grid for field survey. Within each grid, we randomly selected 100×200ha plots for inventory. A total of 50 plots were selected. Each sampling plot was surveyed with same sampling effort of 2-man hrs/plot per survey for a total of four repeat surveys per plot. We collected data on the presence or absence of the target species.

Activity 1.2 Data Analysis: we used geographic reference data of confirmed species presence on each plot sampled to plot the global distribution of the target species using QGIS (version 3.22.0).

Objective 2: Determine the habitat preferences of the intermediate puddle frog in southwestern Ghana.

Activities Conducted

Activity 2.1 Micro Habitat Preferences: We characterize the habitat conditions within our sampling plots and on each plot; we collected site and habitat data (e.g., humidity, temperature, turbidity, PH, canopy coverage, tree diameter measurements at breast height (DBH) as well as geographic coordinates of each plot sampled. The data has been analyzed by developing occupancy models in the program PRESENCE (version 13.6) using combination of habitat quality variables as covariates in the model. Covariates in the most highly ranked model (most parsimonious), was considered as the most important habitat variables influencing the species site selection (habitat preferences). Model selection was based on the Akaike's Information Criterion.

Activity 2.2 Macro Habitat Preferences: we used modeling software's (Maxent version 3.4.1) to describe the broad environmental requirements of the species and to quantify its remaining suitable habitat.

Objective 3. Decrease the willingness of 1000 farmers and raffia palm dealers to engage in activities that threatens the survival of the critically endangered species by 50%.

Activities Conducted

Activity 3.1 Baseline Survey: Prior to our behavior change campaigns, we randomly sampled the views of 200 households to establish a baseline on their knowledge and willingness to conserve the targeted frog species.

Activity 3.2 Conservation Outreaches: We conducted conservation awareness and behavior change campaigns in local communities to promote awareness and interest for our target species. In the last five months we focused most of our outreach efforts mainly in Ankasa -the site where the population of the species persist. We educated farmers and community leaders. The targeted behavior changes included changing the local people's behaviors to engage in activities that promote the survival of the target species.

Outputs and Results

Outputs from Objective 1

We surveyed 52 sites in eight main localities in the Ankasa National Park and Resource Reserve in Southwestern Ghana. We identified four new localities where the species was previously not known to occur (Appendix 1.1). In addition, we found few individuals (mating pairs), leading us to the conclusion that we have identified for the first time the male form of the intermediate puddle frog. We have collected tissue samples for further genetic analysis and formal description of the male intermediate puddle frog. As mentioned earlier, P. intermedius is so far known from only two adult females and one juvenile.

Fig. 1 Field Work Pictures

Team leader conducting field surveys in the Ankasa National Park

Team members conducting field surveys in the Ankasa National Park

Field surveys in the Ankasa National Park

Team leader during frog survey

Intermediate puddle frog in the Ankasa National Park

Team members excited to discover the male intermediate puddle frog

Team photos during field work

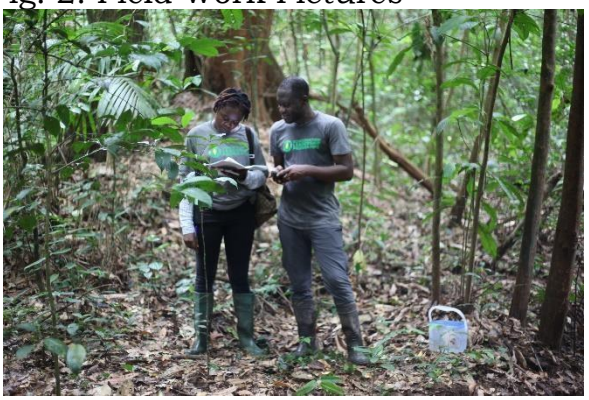
Team leader showcasing his CLP project t-shirt

Outputs from Objective 2

Results show that habitat variables (canopy cover, number of trees greater than 10 cm DBH, number of raffia palm) within swampy parts of primary rainforest habitat are the most important habitat variables associated with the species presence and abundance. The presence of the species was negatively associated with absence of raffia palm and open canopy.

Habitat suitability models developed shows that suitable habitats exist for the species in Ankasa Conservation Area (ACA: appendix 4.3) and some surrounding forests around it although field work has so far failed to record the species out the ACA.

Fig. 2. Field Work Pictures



Team leader (right) together with a team member recording habitat data and GPS coordinates

Field data gathering in the Ankasa National Park

Team members recording habitat data

Team members during field data gathering

Team photos during field work

Section of team members recording GPS coordinates

Outputs from Objective 3

A total of 15 outreach events were conducted by project team members to local farmers and community leaders. In a nutshell, about 1000 local people were reached by our conservation outreach program.

Though we have no data on how often, conservation messages are conducted in the communities, field monitoring conducted by undergraduate students before and after project intervention show the incidence of farmers and raffia palm dealers to engage in activities that threatens the survival of the target species reduced by 100% during project period.

Fig. 3. Field Work Pictures

Section of team members on a house-to-house conservation awareness campaign

Team members excited about community members clear understanding of conservation message

Team leader on a house-to-house campaign during a conservation outreach program

Team member speaking to community members during a conservation outreach program

Team leader speaking to a community elder during a conservation outreach program

Team members educating community members on the plight of the target species

Communication & Application of Results

Two papers will be published from the data gathered from this project. The first manuscript will describe for the first time the male of the Intermediate puddle frog. The second paper will describe the habitat preferences of the Intermediate puddle frog.

Results of the project have also been shared with the local communities, the Ghana ministries of Science, Environment, Lands and Forestry, the Forestry Commission of Ghana, the Ghana Wildlife Division, the Forestry Research Institute of Ghana and the Department of Wildlife and Range land Management of the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana and this is already influencing conservation action on-the-ground.

Monitoring and Evaluation

Quantitative measures were used to monitor the impact on the raising awareness in local communities such as the number of individuals who participated in the awareness campaign. Pre and post test were also part of the method that are implemented in this program to evaluate the effectiveness of awareness campaign.

Achievements and Impacts

This CLP project had many important achievements and impacts relative to the conservation objectives for our target species and the overall conservation aim of our team project. These achievements can be separated into categories related to research, conservation and community involvement, with the most important achievements being listed below.

Research

There have been little to no research conducted for our target species. By conducting some of the first surveys and intensive research, our survey efforts have resulted in the following:

- Discovery of quite a number of the Critically Endangered Intermediate puddle frog populations which we believe to be the largest number of individuals so far known. Whereas until this discovery, no record has been made of this species since 2009. We have already sighted 50 individuals from the discovered streams in the study site which gives hope to the thriving of the species.

- We rediscovered the intermediate puddle frog after 12 years.

- We recorded for the first time the male of the target species. Until now, P. intermedius was only known from two adult females and one juvenile.

- We identified several new localities where the species occur within the Ankasa National Park that was previously unknown.

- We developed the first habitat suitability map for the intermediate puddle frog.

Community Involvement and Conservation

With respect to our conservation awareness campaign, we were able to instill interest and support for our conservation efforts, improve awareness for our goals and give the local people an opportunity to understand the importance of biodiversity, conservation and the survival of our target species.

Another important impact of our conservation efforts is an increased community support for this project. This was achieved following a community education campaign by the team to highlight the threat to this species and the need for participatory approach to its conservation. The community responded to our campaign and they even considering forming local community guards to oversee the protection of the forest and halt threats emanating from within the community. This expression of enthusiasm has resulted in a strong collaboration between the local community and our team and will hopefully translate into realizing our goal of saving this Critically Endangered frog (P. intermedius).

Capacity Development and Leadership Capabilities

The project training which took place after the CLP online training attended by Francis was beneficial for all team members. Specifically, it provided the lead trainer the chance to re-create training materials that fit with the team member condition. The training materials and case studies helped the team increase their individual skills. Specifically, the team learned how to consider different opinions between team members to achieve the project's objectives. Thus, it had helped in creating good teamwork among the members.

Throughout the program, the team had directly learned how to take into account different opinions and paradigms of different stakeholders to find better ways of sharing our knowledge and information more efficiently with different stakeholders. Thus, the team was able to develop varieties of creative communication materials and data sampling, including a novel behavior change program used for different campaign awareness throughout the project timeline.

Section 3

Conclusion

This first ecological study of Phrynobatrachus intermedius resulted in the rediscovery of the species after 12 years. Also, we recorded for the first time what we believe to be the male of the target species. Until now, Phrynobatrachus intermedius was only known from two adult females and

one juvenile. In addition, we identified several new localities where the species occur within the Ankasa National Park that was previously unknown and developed the first habitat suitability map for the intermediate puddle frog. Finally, our team increased conservation awareness and interest in the species through the community outreaches that were conducted. Further work is needed to guarantee the long-term survival of this critically endangered species.

Problems Encountered and Lessons Learnt

1.Community engagement worked well: Through many successful collaborative and field trips requiring local support and assistance, we have improved understandings for our project conservation goals and helped create interest and awareness within the community for our field work.

2.Conservation outreaches: We used different approaches including house to house campaigns to raise conservation awareness in local communities. This yielded remarkable results. Local people begun to treasure the value of the endemic target species on the reserve and led to their willingness to engage in activities that promotes the survival of the target species and further support efforts at conserving this species.

These successes notwithstanding, we did encounter some challenge. This concerns the extensive travel in somewhat rough roads and terrains to conduct field surveys. Here, we had to access the study site with a 4-wheel drive especially during the raining season.

A lesson learned is that teamwork and regular team discussions help the team to stay informed and motivated and proved to be key to our project success. In addition, we have leant that including and providing opportunities for local people and stakeholders to take part and have responsibility in our efforts provides collective and enduring results that everyone can be proud of.

In the Future

This work will continue by focusing in two key areas. First, work will focus on the population size estimation of the target species for future monitoring. Second, we will seek continuous funding for restoration of degraded sites within the reserve, as well as enhancing local capacity to effectively identify and manage the species to guarantee its long-term survival.

Financial Report

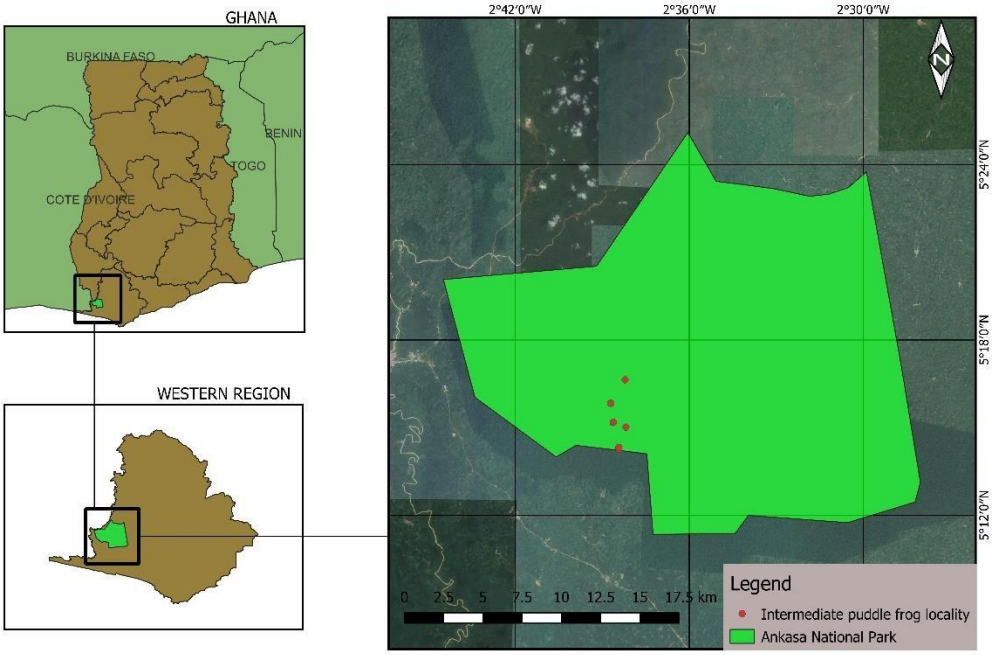
Itemized expenses	Total CLP Requested (USD)*	Total CLP Spent (USD)	% Difference
PHASE I - PROJECT PREPARATION			
Communications (telephone/internet/postage)	250.00	222.42	-11%
Field guide books, maps, journal articles and other printed materials	77.00	77.00	0%
Insurance			
Visas and permits	300.00	300.00	0%
Team training	760.00	760.00	0%
Reconnaissance	950.00	950.00	0%
Other (Phase 1)			
EQUIPMENT			
Scientific/field equipment and supplies	1,771.00	1771.00	0%
Photographic equipment	250.00	250.00	0%
Camping equipment	710.00	710.00	0%
Boat/engine/truck (including car hire)			
Other (Equipment)	310.00	310.00	0%
PHASE II - IMPLEMENTATION			
Accommodation for team members and local guides	700.00	700.00	0%
Food for team members and local guides	1,800.00	1800.00	0%
Travel and local transportation (including fuel)	2,645.00	2645.00	0%
Customs and/or port duties			
Workshops	1657	1657.00	0%
Outreach/Education activities and materials (brochures, posters, video, t-shirts, etc.)	1,620.00	1628.90	1%
Other (Phase 2)	1,000.00	990.90	-1%
PHASE III - POST-PROJECT EXPENSES			
Administration			
Report production and results dissemination	200.00	227.42	14%
Other (Phase 3)			
Total	**15,000.00**	**14,999.64**	

Section 4
Appendices

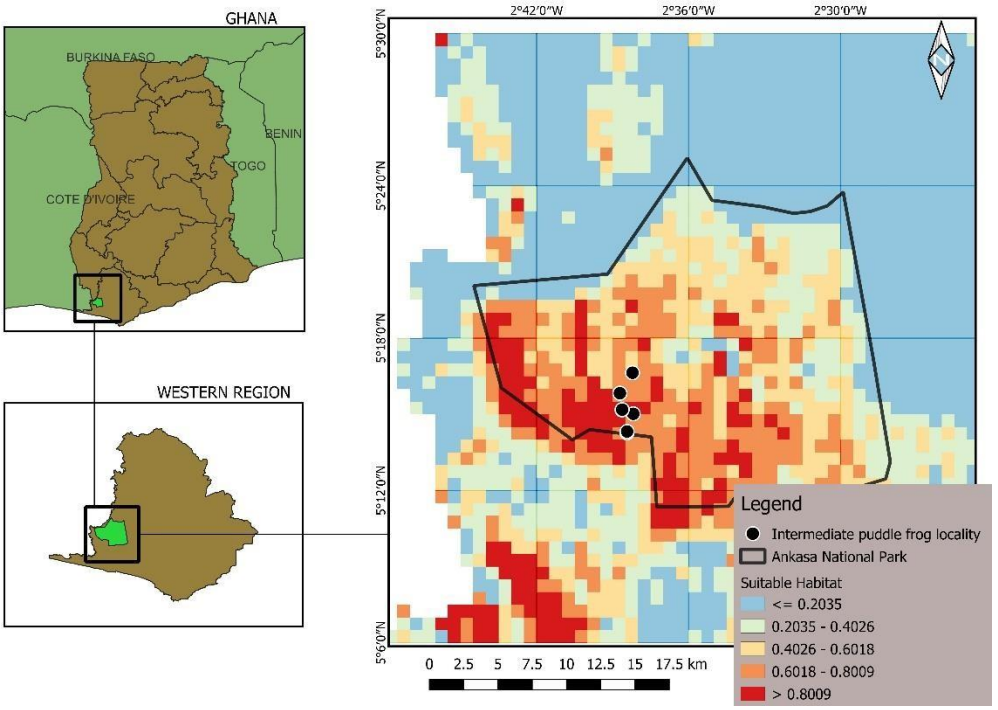
Appendix 4.1 CLP M&E measures

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project	1	
Number of species assessments contributed to (E.g., IUCN assessments)		
Number of site assessments contributed to (E.g., IBA assessments)		
Number of NGOs established		
Amount of extra funding leveraged ($)		
Number of species discovered/rediscovered	1	Rediscovered the intermediate puddle frog after 12 years
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)		
Number of species/sites legally protected for biodiversity	1	Ankasa Conservation Area
Number of stakeholders actively engaged in species/site conservation management	4	
Number of species/site management plans/strategies developed		
Number of stakeholders reached	8	
Examples of stakeholder behaviour change brought about by the project.		
Examples of policy change brought about by the project		
Number of jobs created		
Number of academic papers published	2	Manuscript in preparation
Number of conferences where project results have been presented		

Appendix 4.2 Distribution map of the Intermediate puddle frog



Appendix 4.3 Habitat suitability model of the Intermediate puddle frog



Address List and Web Links
Herp Conservation Ghana: www.herpghana.org

Distribution List

1. Conservation Leadership Program
2. Forestry Research Institute of Ghana (FORIG)
3. Ghana Wildlife Division (GWD)
4. Ghana ministries of Science, Environment, Lands and Forestry
5. Herp Conservation Ghana (Herp-Ghana)
6. Faculty of Renewable Natural Resources
7. Ankasa Traditional Council