

## R9: Joint recommendation of the examiners on a candidate for the degree of PhD by Research

The examiners are required to complete a joint report on the performance of the oral examination and make a joint recommendation to the **Secretary** of the **Research Programmes Sub-Committee**. If examiners are unable to reach a joint recommendation, a separate form should be completed by each examiner.

**NB.** Under the terms of the Data Protection Act this report will be available, upon request, to the student

### The Candidate

Name: Daisy MARYON

Director of Studies: Dr David Lee

Title of Submission: Population ecology and implications for conservation of Utila Spiny-tailed Iguanas in Utila island Honduras

### The examining team present:

External examiner(s) .....Dr Charles Knapp.....

Internal examiner(s) .....Dr Luis Cunha.....

Chair .....Dr Dawn Story.....

Names of supervisor's present, if any .....N/A.....

Names of any other persons present, if any ..... N/A.....

**Report of the examiners on the student's performance in the oral examination** giving a reasoned assessment of the candidate's performance (continue on separate sheet if necessary):

Overall, the examiners thought that Daisy defended her thesis well, answering questions in detail which complemented the written work and demonstrated the knowledge that was missing in the thesis.

Areas of work to focus on the thesis are included in Annex I as well as illustrated within the examiner's copies of the report.

### Additional information:

Are you satisfied that the thesis presented is the candidate's own work? **YES**

Did the candidate show a satisfactory knowledge and understanding of:

(i) matters relating to the thesis **YES**

(ii) background studies to the subject of the thesis? **YES**

In the case of a candidate whose research programme was part of a collaborative group project, did the oral examination demonstrate that the candidate's own contribution was worthy of the award? **N/A**

**Following completion of the examination, examiners may recommend one of the following outcomes:**  
please circle as appropriate

**A. The candidate fulfils the criteria of the award for which they are examined:**

The candidate is awarded the degree of PhD

- I. **Subject to major\*\* amendments to the submission being completed to the satisfaction of the internal and external examiner(s)**

Signed.....*Juiri Felipe Dan Naran Cooke*.....Date.....11<sup>th</sup> November 2021.....

**Examiner**

*Charles Knapp*

.....11<sup>th</sup> November 2021.....

**Examiner**

Signed.....*Dawn L Story*.....Date...10<sup>th</sup> November 2021.....

**Chair**

**Confirmation of Award**

Signed.....Date approved.....

Chair/Secretary of RPSC

\* where a candidate is awarded subject to **minor** amendments, the amendments are expected to be completed within a maximum period of 3 months

**\*\* where a candidate is awarded subject to major amendments, the amendments are expected to be completed within a maximum period of 6 months**

**\*\*\*** where a candidate is required to resubmit their thesis and be re-examined, the revised thesis must be submitted for re-examination within a maximum period of 12 months (please refer to section 13 of the Research Degree Regulations).

## Annex I

### Part I – Considerations for the major revision of the dissertation by the external examiner

A lot of passion went into this work. The increased knowledge about the species and the capacity infrastructure developed over the course of the study will help the species persist. From a science perspective, including publishing, there should be more emphasis on explanation of study design and the appropriate use of statistics. Daisy should be prepared to answer why she chose certain methodologies and statistical methods for the analyses. Also, she should be prepared to answer “big picture” questions about the role of these types of studies in advancing conservation. Are they needed? To what extent? Where have they worked in the past?

**Chapter 1:** Overall, this section fine. I suggest tightening the writing here and throughout the thesis to reduce redundancies. There are several themes that are repeated throughout. The species and island descriptions are repeated in Chapter 2, so I suggest removing them from one section to reduce redundancy (see suggestion on removing Chapter 2 and incorporating the text in other chapters). I suggest providing more specificity to the objectives toward the end of the chapter and perhaps include the chapters in which you report on the results. I suggest using active voice in your writing throughout but especially when describing the objective and what you did to address your questions. The current objectives are somewhat vague. I understand that this study expands the geographic scope of past research to obtain more accurate estimates of population size, and to quantify the area of occupancy for *C. bakeri*.

My understanding is that another focus includes updating demographic, ecological and behavioural information. These are listed as broad concepts rather than specifics. What kind of breeding behaviour? Does this include nest site selection? Mate choice?

Habitat preference is listed. Does this include adults? Hatchlings? How will these data be collected? Using what techniques? What does to study the effects of invasive species mean? Did you quantify predation? You also mention hybridization in passing before providing more detail towards the end. I suggest keeping the order the same as how they appear in the chapters. You also mention nesting habitats, migration routes, uncontrolled harvests, etc. I suggest stating the objective and what you did to address the question using active voice.

Finally, review the references throughout for consistency. I made more specific editorial comments in chapters 1 and 2 before focusing more on the topics in subsequent chapters. I do suggest cleaning up the writing throughout the entire thesis.

**Chapter 2:** This section is labeled methods and I suggest referring to specific comments in the text to clarify techniques used. However, only some methods are included here while other methods are described in specific chapters (e.g., Chapter 3. Habitat classification; chapter 4. Distance sampling). If this is the case, why not delete this chapter and keep with chapter-specific methods. The general study site and species description can be included in Chapter 1.

**Chapter 3:** The chapter provides an estimate of habitat coverage across Utila. Some improvements to consider include repeating the same study but use Landsat images from earlier in the decade to estimate habitat loss across a longer time frame. If feasible, this is important because habitat estimations/comparisons over time are made from earlier estimation studies without thorough recognition that the classification schemes may have been different. Also, there are very little statistics reported, other than percentages. Were confidence intervals generated in the analyses? Other reported results are anecdotes. Finally, the chapter ends in a slightly disappointing manner by suggesting that more in-depth habitat studies be conducted. I thought that was the intent of this thesis.

**Chapter 4:** I suggest significant revisions to Chapter 4. The methods need clarification, and more data need to be displayed. For distance sampling, were juveniles treated the same in the analyses? The detection probability of juveniles and hatchlings I presume would be much lower than for adults. Was this considered? No AIC values are provided. If this is to be published, they need to be reported, typically in a table.

The habitat preference methodology needs more clarity and justification. As I understand, plots were constructed, and variables collected. Plots were then revisited multiple times to record iguanas. Were all recordings used in the analyses? If so, these are repeated measures and should be treated as such. Beyond that, the challenge with this method is that static plots were established, and iguanas recorded in each plot (perhaps multiple times). Why weren't variables recorded for every iguana observed during distance sampling? Then you would have been able to determine if animals were found in specific habitats in the same proportion as found on the island.

Also, please describe the biological significance for recording so many variables. Why does the number of saplings or stems matter? What is the difference between a sapling and a stem? One variable (prey availability-crabs) was included in the results but not in Table 4.3. In addition, how was prey availability

measured? The variables seem to include presence/absence variables along with continuous variables and percentages. The variables also include non-habitat variables including machete marks and plastic. This is a statistics challenge. How was it accounted for?

The chapter conclusion focuses on poaching, but it is not clear why that is the focus. The chapter was about population density and habitat use. The only hunting metrics included machete marks on trees. That is not the most robust method for studying poaching pressure.

**Chapter 5:** I suggest changing the title of this chapter to be more specific about what was investigated (i.e., home range, reproductive ecology, and body condition). In the introduction, detail on the importance of home range is provided. However, the other natural history components of the chapter (reproductive ecology and body condition) are excluded. If you provide more detail about one element of natural history, you should provide additional detail about the other natural history attributes investigated in this study.

Natural history information is often cited as important for informing conservation. Be prepared to provide specific examples of how natural history information advances the development of conservation management strategies.

A challenge with the chapter that should be addressed includes providing more information about the study sites (e.g., GPS coordinates, size, habitat characteristics). Only Site A and B are included, making it difficult to understand possible reasons behind differences and similarities of natural history attributes. One example includes differences in home range size. Are sizes different because study areas are different in size, or for some other reason. Also, more information will serve as an historic record for potential future studies.

I suggest provided clarity on why only 19 individuals were used in analyzing home ranges when 43 were affixed with transmitters. Some home range calculations were made with very few relocation records. Be prepared to justify how such analyses (e.g., 95% isopleths) would work with low sample sizes. What are the challenges associated with small sample sizes in these types of analyses?

Please provide clarity on recording sex ratios of hatchlings, especially given that some were captured in the "area" possibly several days after emergence. Is this a true indicator of hatchling sex ratio? Unless you are recording hatchlings in the nest or as they emerge, there may be selection bias several days after emergence if one sex or more prone to predation or dispersal.

Throughout the chapter, I suggest providing more thorough descriptive statistics including standard deviation and ranges. Also, provide more information on how the clusters of hatchlings were determined. It seems like it was done by "sight" and not using statistical inferences.

**Chapter 6:** This chapter is mostly a collection of anecdotal observations and records of conservation and outreach activities. Though the observations provide a nice narrative, I do not think these results are publishable because of the lack of standardized methodology and small sample sizes. Social science is challenging to execute, and advanced preparation is needed to add rigor to the narrative. The documentary activity logs, and Red List assessment process provide a nice narrative.

**Overall:** The thesis represents passionate and dedicated work by Daisy. Her efforts are commendable, and she is making a difference for the survival of the species. The thesis, however, needs attention. The writing needs to be tighter. I made editorial suggestions at the beginning of the thesis but then tapered off my editorial comments. I did include both editorial and scientific comments that should be addressed throughout the thesis. There is a relative lack of statistics throughout the thesis. Some results seem to hinge on percentages or "sight" analyses. Better use of appropriate statistics to drive the narrative would help.

## Part II – Considerations for the major revision of the dissertation by the internal examiner

A huge amount of effort was put in the field by the candidate and the valuable evidence collected can certainly play a role in the conservation of the species. However, the quality of the writing and structuring of the thesis demand much attention. In its present form is not publishable and the lack of details hinders the overall impact of the results. Therefore, please check the comments below and pay a careful attention to the comments and suggestions done in the examiner's versions of the submitted thesis document.

**Layout and overall structure:** The document formatting is not appropriate and does not follow USW rules for thesis formatting, therefore it is asked that document layout should match the USW request. Please consult the "Research Degree Regulations" documents available at:

<https://gradschool.southwales.ac.uk/resources/>

More importantly, the document needs major proofreading as some inconsistencies are noticeable (e.g., typos, lack of italics in some taxa, acronyms need to be defined, inconsistent referencing, variable letter type, etc.). Moreover, several references are missing from the bibliography. Subsections and figures/tables numbering needs to be checked.

**Presentation, Figures and Descriptions:** Table and figure description/captions overall need more detail. Keep in mind that a figures (and a table) need to be self-explanatory and should not be required consulting the running text to understand the included features (e.g. acronyms, labels, etc.). Use the figure legend and table description as complete as possible. Also, all the figures need to be cited and referred/described within the running text (e.g., Fig 1.2 is missing in the text). Labelling and numbering of figures is also inconsistent (e.g., Figure vs figure vs Fig, and figures with same numbers, etc.). If possible, include a scale in your photos.

**Scientific methodologies, data quality and analysis:** The data is of good quality, however there are some incongruencies along the document that need clarification and affect the interpretation of the data analysis and results presentation. This is mainly due to the lack of detail in some of your methods. Concerning the data analysis, the statistical approaches employed, need to be better described. For instance, a more detailed explanation on the selection of specific sampling points would be appreciated and, overall, the statistical approaches are not clear.

**Discussion of findings and overall importance:** The abstract is misleading in a way that several of the identified new threats come from single observations and were not collected in a systematic manner (e.g. presence of oceanic plastic debris, predation by other animals). Overall, the evidence generated in Daisy's thesis is valuable and several important results can be identified:

- 1) The detected decrease in mangrove area size is an important finding and can be used to inform policy locally (chapter 3), in particular if the candidate is able to contrast with a longer timescale;
- 2) Decreases in animal densities in both periods of sampling when compared to previous studies are important;
- 3) The population estimates and sex ratio are important.

However, and overall, the importance of findings is barely focused on the discussion sections and needs to be better explored in the thesis. On the other side, the thesis contains a large amount of non-systematic records (anecdotal reports) that need to be smooth down in terms of importance and require a better structuring.

**Overall language:** The language is reasonable in most of the document but the lack of detail, and inconsistencies offer a weak composition to the reader that is hard to follow in some parts.

### **Specific details about chapters**

Chapter 1: this chapter would benefit of a more well-structured storyline. Some parts are too broad and miss details. Overall, and however, the weak structuring, the candidate presents a good amount of background information. Still, there is some redundancy and being more concise would certainly benefit the assertions made. Also, the document would benefit from a concise aims/objectives section (towards the end) with some hypotheses delineating the overarching impact of your study (related with the associated chapters). Include a more detailed information on the background geological history and the phylogeography associated with these animals.

Chapter 2: I am puzzled about this one as it is entitled as "methods" but then you give background information during the first two subsections. Again, some of the information described here is redundant with the previous chapter and could be merged with chapter 1 and made into a more concise text. I am not sure about the role of the chapter as most of it sounds to be redundant with the rest of the thesis. Also, data analyses are not fully covered in this section. As a suggestion, this chapter should be removed and the content merged into the other chapters.

Chapter 3: In this chapter it is proposed to map the different habitats in Utila Island, using both field and satellite sourced data. However, some topics are not clear to me. For instance, why land change only after 2017? Two sources of data are used in this chapter, Landsat and field collected data, however, is not clear in the methods if the data was used together, and if yes, how it was integrated in the same analysis.

Several figures and tables are not well explored in the text. Furthermore, the amount of anecdotal records should be minimized or even avoided as part of your discussion. Also, the chapter is mainly focused on the mangrove area, although the nature and extent of the data offered an opportunity to better understand the overall land change in the island, which is reflected by the title of the chapter. I suggest changing the title and the objectives to accommodate the focus on the mangrove. Also, suggesting some “avenues” for mitigating land change, as evidenced in your mapping, could also be discussed/explored.

Chapter 4: This chapter presents some valuable results but then the discussion and implications are weakly explored. The methods need some rewriting, in particular the selection of study sites and how the transects were defined (you could include a schematic representation, or a map), considering the diversity of habitats that you wanted to cover. You could include a measure of sampling effort to better show if the level of effort was appropriate (or not). Also, the model fit values are not disclosed (maximum likelihood estimation?). What is not clear, is if coastal areas and mangrove forests include more than one habitat category and/or if human disturbance was considered. The discussion is weak, and the interpretation of your results needs to be expanded. The importance of metadata variables associated with the animal presence record are not discussed, however it is presented and analysed in the results.

Chapter 5: The aims needs to be explicitly stated. Overall, there is inherent value in the data collected but some details are missing in the methods and results and the discussion could be better explored in light of background literature. You should show that your statistical approaches were appropriate for the analysis.

Chapter 6: This chapter presents an attempt to use data sourced on range of different approaches, complemented by several non-systematic observations (anecdotal evidence). The aim of the chapter needs to be clear and stated and maybe working towards an hypotheses-driven question would benefit the scope of the work. Several sections of the methods are missing detail, in particular how qualitative data was captured and structured. The reason for the selection of the genetic markers is also not clear, as well a lack of detail about the hybridisation data analysis. Also, some claims need to be smoothed as the work does not present evidence in support of it, for instance, the case of predation on iguanas by rodents/raccoons. Therefore, the candidate needs to be more accurate with the language and claims based on the collected data. Also, the overall chapter structure is hard to follow, the results and discussion cannot be distinguished. I suggest keeping the structure as in the other chapters for better readability. Then in section 6.5 the candidate deploys a description of a management approach which does not clearly link to the results of the chapter. Also, the fact that almost every single visual aid is not properly cited in the text makes the interpretation very difficult.