

**CONSERVATION, ECOLOGY AND GENETICS OF THE CAPE  
VERDE WARBLER**  
*Acrocephalus brevipennis*  
Second field season - 2014

Report on fieldwork in Cape Verde  
For the African Bird Club



Colour-ringed Cape Verde warbler, *Acrocephalus brevipennis*, S. Nicolau, September 2014

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**April 2017**

## Project details

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## Funding and support



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## 1. Introduction and aims

The Cape Verde warbler *Acrocephalus brevipennis* is an endemic bird of this archipelago classified as "endangered" (BirdLife International 2016). It currently exists on Santiago, Fogo and S. Nicolau (Batalha *et al.* 2017). Our team at the University of East Anglia is currently studying the conservation, ecology and genetics of this endemic passerine as part of a PhD project. We undertook a very successful first field season in Cape Verde in 2013, with the main aim of collecting blood samples for genetic analyses (see Batalha 2014 report). In 2014, we returned to Cape Verde with the main aim of collecting Cape Verde warbler habitat data and increasing blood sample size. We collected habitat, blood and morphometric data between September and December 2014. As previously, we identified each sampled bird individually with metal and colour-rings and recorded bird songs when possible. All the work was done together with relevant national stakeholders in Cape Verde and national and international field assistants. The data collected was analysed, and the analyses produced one scientific article and a PhD thesis. These publications have the ultimate goal of disseminating information on this endemic bird and informing future conservation measures. In this report, we present the data collected during the field season of 2014.

The main aims of this second field season were the following:

1. Collect habitat data on a minimum of 15 locations per island – ten locations where the warbler was present and five from where the warbler was absent
2. Increase blood sample size - particularly on S. Nicolau where we only had collected blood from 15 birds in 2013
3. Confirm the size and area of occurrence of the population of S. Nicolau
4. Survey the island of Santo Antão for warblers
5. Record data on biometrics, moult, breeding stage and parasites and additional male songs - minimum of five birds per island
6. Strengthen collaborations with local stakeholders and technicians

## 2. Project activities and outcomes

### Habitat

During this field season we prioritized systematic habitat data collection. We collected habitat data on 63 independent locations across the three islands: 29 locations on Santiago, 17 on Fogo and 17 on S. Nicolau. On each location, a minimum of three and a maximum of four 10x10 m terrain plots were sampled. On each plot, we waited a total of ten minutes (first five in silence and the last five with a male Cape Verde warbler playback) to see if the warblers were using the plot. If the birds came to the plot, whether spontaneously or by reacting to the playback, it was considered a positive plot. If the birds did not come, it was considered a negative plot. On each location we could have all positive plots, all negative plots or positive and negative plots combined. Within each plot, we recorded the elevation, slope, maximum bare ground cover, maximum shade cover, maximum cover of four different vegetation types (trees, reeds, woody shrubs and herbaceous shrubs), average maximum vegetation height (average of five points), average branch and stem diameter at breast height (average of 20 stems/branches/trunks), maximum vegetation height of four vegetation types (trees, reeds, woody shrubs and herbaceous shrubs), and average maximum number of insects on 625cm<sup>2</sup> (the size of an A4 paper) of leaves and branches (average of four points).

### Blood samples

We caught and ringed Cape Verde warblers as previously. We used mist nets, attracting them with male songs from their respective island. Each bird received a numbered metal ring and a unique combination of three colour rings resistant to UV radiation (Redfern & Clark 2001; see Table 4 in Appendix). All rings had an internal diameter of 2.3 mm and were applied to the birds' tarsus. The metal rings were created especially for Cape Verde, together with Biosfera I, with the address *die M. Amb. C. Verde* (Cape Verde Ministry of Environment). The colour ringing scheme has been submitted to the platform *European Colour-ring Birding*, and are available online at <http://www.cr-birding.org/node/2651>. We increased our sample sizes to 65 Cape Verde warblers for Santiago, 43 for Fogo and 30 for S. Nicolau. All birds were ringed, measured, and blood samples were collected by puncture from the brachial vein and stored in 100% ethanol. During one week in September 2014, we thoroughly searched all the valleys with potential suitable habitat on Santo Antão with the collaboration of Emitério Ramos and Gilda Monteiro from the Protected Areas of Santo Antão. Unfortunately, no warblers were found, confirming the results from previous searches by the staff of the Protected Areas of Santo Antão.

### **S. Nicolau**

The population of S. Nicolau was the first to be discovered, in the 1860s (Dohrn 1871). At that time, the Cape Verde warbler was said to be “numerous” and to be living mostly in the reed patches on valleys and slopes of that island. After 1924, it was not seen again for many decades and thought to be extinct (Hazevoet 1995). However, one specimen collected in 1970 was discovered in a museum in Lisbon, and further searches revealed that the warbler still lived on that island (Donald *et al.* 2004; Hazevoet *et al.* 1999). The population of S. Nicolau was estimated at 8 – 10 breeding pairs in the late 1990s (Donald *et al.* 2004; Hazevoet *et al.* 1999), and no further observations were reported since then. In 2013, we searched thoroughly for the warbler on S. Nicolau and found ca. 12 – 13 territories in the central part of the island, mostly in the reed patches around the valley of Canto Fajã and the mango trees of Ribeira Queimadas and Tucudo (Garcia-del-Rey 2016). But they were not found in the forest of Monte Gordo, the abandoned reed patches to the west side of the mountain, the plantations on Canto Fajã or the isolated plantations in the village of Carriçal on the far east of the island (Batalha *et al.* 2017; Garcia-del-Rey 2016). We used this second field season to try to confirm the number of breeding pairs living on S. Nicolau and the area which they occupy. We performed thorough searches, in most of the previously searched areas plus some new ones (e.g. the valley of Covoada). Although we did find birds on Covoada, we confirmed that the Cape Verde warblers are absent from the forest of Monte Gordo or the plantations on the valley of Canto Fajã. We found ca. 12-13 breeding pairs, all on the central part of the island. Even considering that some birds were present but undetected and taking into account the habitat patches that we could not survey, we expect that there is a maximum of 25 breeding pairs of Cape Verde warbler on the island of S. Nicolau.

### **Santo Antão**

There are no confirmed records of the presence of the Cape Verde warbler on Santo Antão (Garcia-del-Rey 2016; Hazevoet 1995). However, the island is largely covered in lush habitat, with sugarcane plantations, mountain forests, and deep valleys covered with dense green vegetation. It is also the only island in Cape Verde with permanent fresh water streams (Hazevoet 1995). For those reasons, it was hypothesised that the habitat could be suitable for the warbler and that an undiscovered population might exist there (Hazevoet 1995). Furthermore, our team was contacted in 2014 by a couple of amateur ornithologists who mentioned they might have seen the Cape Verde warbler in Santo Antão in 2012. Therefore, we went to that island to search for the warbler. We spent one week there, working in collaboration with the director and staff of the Protected Areas of Santo Antão, and thoroughly

surveyed for the warbler in all the areas with potentially suitable habitat. We used a combination of transects and point counts with playbacks. Unfortunately, we never found the slightest sign that there could be warblers on Santo Antão, confirming previous findings by the staff of the Protected Areas of Santo Antão and personal communications made by Aline Rendall (INIDA).

### **Morphology, parasites and song**

Standard biometric measurements were taken from every bird caught including measurements of the physical condition of the bird (muscle, fat), breeding season and moult. Parasite data were also collected, by counting the number of mites on flight feathers and collecting faecal samples when possible. We recorded a total of 72 sound files at 50 different locations across the three islands; 16 in Santiago 20 in Fogo and 14 in S. Nicolau. Recorded songs were uttered by previously colour-ringed male or were recorded in known locations. Most of these files contained loud, good quality male songs free of background noise and were subsequently used to produce playback files. These were used to assess the Cape Verde warbler's reaction to playbacks of different origins in 2016.

### **Collaboration with national stakeholders and technicians**

This second fieldwork season for the study and conservation of the Cape Verde Warbler *Acrocephalus brevipennis* took place during the breeding season, starting on September 20<sup>th</sup> 2014 and ending November 28<sup>th</sup>, 2014. A key aspect of the success of long-term in situ conservation projects is the involvement of local partners from the start. Similarly to the previous year, we contacted all national authorities for permission to undertake the work and kept them informed of progress throughout the fieldwork. When possible, we included local technicians in our field trips, so that they would follow the avian monitoring techniques used. Several technicians and directors from the National Institute for Agrarian Research and Development (INIDA) and Natural Parks of Serra Malagueta, Fogo and Monte Gordo and the Protected Areas of Santo Antão accompanied the team on field trips. Thanks to funding from the African Bird Club, we hired a Cape Verdean biologist (Naya Ifigénia Correia Sena), recommended to us by Jaelsa Moreira, our field assistant during the first field season. Naya did an excellent work during the entire duration of this field season. Similarly to the previous year, all stakeholders showed great interest in learning and helping to carry out the work, which contributed to the success of this fieldwork. The exchange of information between the technical team and Cape Verde partners was excellent, facilitating learning for both parties and

effectively contributing to the collection of quality data in the field. This time, in addition to bird ringing and sampling techniques, Cape Verdean biologists learned about and assisted with the collection of habitat data in the field, namely vegetation parameters (species identification and classification, height, percentage cover, trunk diameter). In particular, the Cape Verdean field assistant Naya Sena accompanied us on Santiago, Fogo and S. Nicolau. She worked with us during enough time to learn and develop technical skills in all aspects of passerine bird ringing, from mist-net setting to handling and measuring birds carefully. She also developed her skills in monitoring the Cape Verde warbler (e.g. reading colour-ring codes, observing the bird's behaviour) and sampling vegetation and insects in the field. Later on, she worked as a field biologist specialising in ornithology in Cape Verde and the Canary Islands and worked with us again in 2016. Similarly to the first field season, during this second field season we noticed that Cape Verdeans from all social classes value nature and biodiversity and are extremely interested, curious and eager to learn more. We strongly believe that this kind of collaborative work should continue to take place in Cape Verde in order for local biologists to keep developing their field skills.



### 3. Conclusions

The second field season of this project had excellent results and all key objectives were achieved.

1. We collected habitat data on 63 independent locations across the three islands: 29 locations on Santiago, 17 on Fogo and 17 on S. Nicolau
2. We increased our blood sample sizes to 65 samples for Santiago, 43 for Fogo and 30 for S. Nicolau
3. We confirmed that the size of the population of S. Nicolau is ca. 12-25 breeding pairs, and is limited to the vegetated valleys and slopes of the central part of the island
4. We confirmed that there is no current Cape Verde warbler population on Santo Antão
5. Morphological and physiological parameters were recorded for all birds sampled; we also recorded songs from birds found on 50 different locations on the three islands: 16 on Santiago 20 on Fogo and 14 on S. Nicolau
6. Collaborations were maintained with all national stakeholders and technicians involved in the conservation of the Cape Verde warbler (DGA, INIDA, Natural Parks of Serra Malagueta, Fogo and Monte Gordo and Protected Areas of Santo Antão)

## Appendix

### 1. Expenses

Table 1 – total fieldwork expenses in pounds sterling (GBP), using the conversion rate in December 2014.

<b>Expenses type</b>	<b>GBP</b>
Food	911.03
Transportation	1313.19
Accommodation	333.62
Local services <sup>1</sup>	844.89
Communications	150.50
Equipment	77.63
Other (health, visa, etc.)	56.79
<b>Total expenses</b>	<b>3687.65</b>
<b>African Bird Club contribution</b>	<b>3000.00</b>

<sup>1</sup> Expenses with local services include the salary of local field assistant Naya Sena and money paid directly to Cape Verdean citizens for their help with work or logistics and money spent directly on services from Natural Parks or the local organization Associação Pai António.

### 2. Tables

Table 2 - Colour ring colours used to individually recognize Cape Verde warblers. The position of the metal ring differs between islands to facilitate identification of potential dispersing birds.

<b>Colour</b>	<b>Abbreviation</b>	<b>Leg (left/right)</b>
<i>Dark blue</i>	<b>B</b>	L/R
<i>White</i>	<b>W</b>	L/R
<i>Orange</i>	<b>O</b>	L/R
<i>Red</i>	<b>R</b>	L/R
<i>Yellow</i>	<b>Y</b>	L/R
<i>Cabo Verde (Ministério do Ambiente) metal ring</i>	<b>X</b>	Santiago: bottom right Fogo: bottom left S. Nicolau: upper left

**Table 3 – total number of Cape Verde warblers sampled per island, during the breeding seasons of 2013 and 2014, by age and sex. Age was assessed using the criteria typically employed by BTO ringers. Sex was molecularly determined by PCR following Griffiths (Griffiths *et al.* 1998). All birds were ringed, measured, and blood samples were collected.**

Island	Age			Total
	Adults	Juveniles	Age unknown	
<b>Santiago (24-11 to 16-12-2013 and 27-09 to 12-11-2014)</b>	<b>54</b>	<b>9</b>	<b>2</b>	<b>65</b>
Females	17	6		23
Males	37	3	2	42
<b>Fogo (19 to 31-12-2013 and 6 to 24-10-2014)</b>	<b>34</b>	<b>3</b>	<b>6</b>	<b>43</b>
Females	6	3	1	10
Males	28		5	33
<b>S. Nicolau (7 to 18-01-2014 and 17 to 30-11-2014)</b>	<b>25</b>	<b>4</b>	<b>1</b>	<b>30</b>
Females	6	3	1	10
Males	19	1		20
<b>Total</b>	<b>113</b>	<b>16</b>	<b>9</b>	<b>138</b>

**Table 4 – all plant species in potentially suitable Cape Verde warbler habitat, i.e. all plants found on the sampled 10x10 m plots where the warbler was present and absent, in Santiago, Fogo and S. Nicolau between September and December 2014; *unidentified Mimosacea* refers to unidentified trees of this family.**

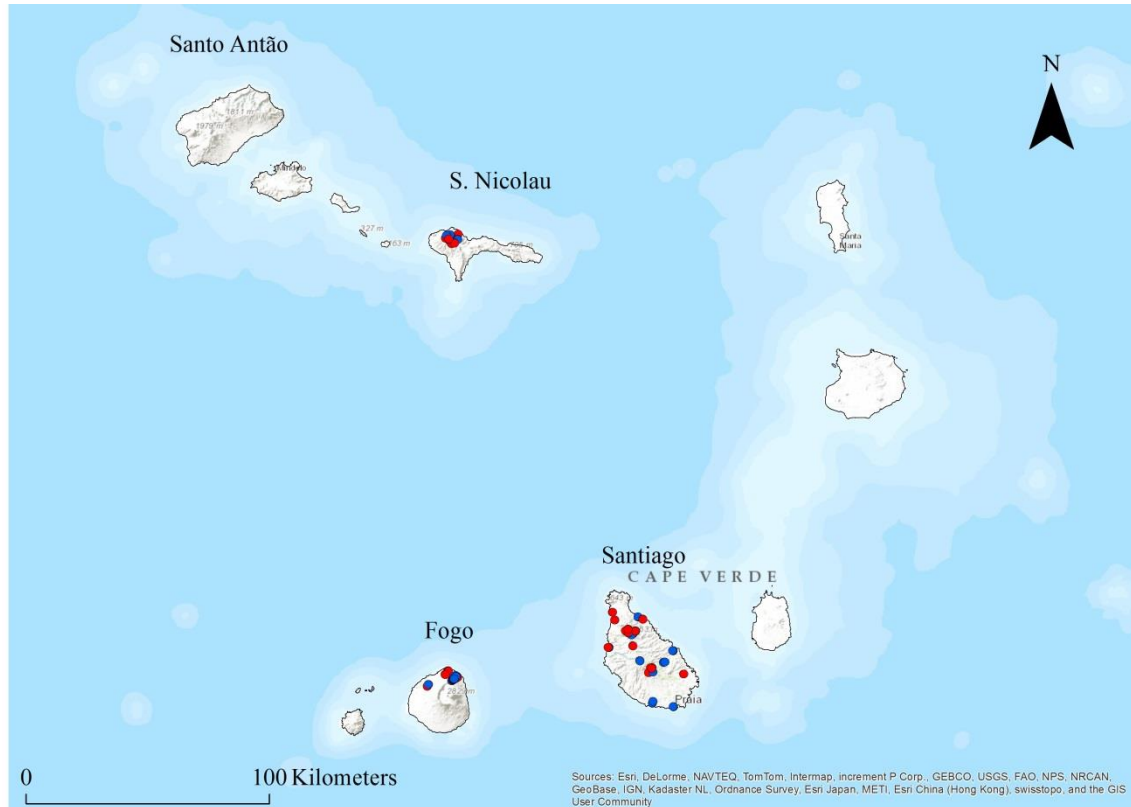
<i>Abutilon</i> spp.	<i>Eucaliptus</i> spp.	<i>Opuntia ficus-indica</i>
<i>Anacardium occidentale</i>	<i>Euphorbia tuckeyana</i>	<i>Parkinsonia aculeata</i>
<i>Annona</i> spp.	<i>Ficus capensis</i>	<i>Passiflora edulis</i>
<i>Artemisia gorgonum</i>	<i>Ficus sycomorus</i>	<i>Persea americana</i>
<i>Artocarpus integrifolia</i>	<i>Forsskaolea procrdifolia</i>	<i>Phaseolus vulgaris</i>
<i>Arundo donax</i>	<i>Fucraea foetida</i>	<i>Phoenix</i> spp.
<i>Cajanus cajan</i>	<i>Grevillea robusta</i>	<i>Phyllanthus acidus</i>
<i>Calotropis procera</i>	<i>Grewia villosa</i>	<i>Pinus</i> spp.
<i>Capsicum frutescens</i>	<i>Hyptis pectinata</i>	<i>Pisum sativum</i>
<i>Carica papaya</i>	<i>Ipomoea</i> spp.	<i>Prosopis juliflora</i>
<i>Cassia bicapsularis</i>	<i>Ipomoea batatas</i>	<i>Psidium cattleianum</i>
<i>Ceratonia siliqua</i>	<i>Jacaranda mimosifolia</i>	<i>Psidium guajava</i>
<i>Citrus sinensis</i>	<i>Jatropha curcas</i>	<i>Ricinus communis</i>
<i>Citrus tangerina</i>	<i>Khaya senegalensis</i>	<i>Saccharum officinalis</i>
<i>Citrus x limon</i>	<i>Lantana camara</i>	<i>Sesbania</i> spp.
<i>Clitoria ternatea</i>	<i>Leucaena leucocephala</i>	<i>Solanum tuberosum</i>
<i>Cocos nucifera</i>	<i>Lotus purpureus</i>	<i>Syzygium jambos</i>
<i>Coffea arabica</i>	<i>Malus domestica</i>	<i>Tamarindus indica</i>
<i>Conyza varia</i>	<i>Mangifera indica</i>	<i>Xanthium</i> spp.
<i>Cupressus sempervirens</i>	<i>Manihot esculenta</i>	<i>Zea mays</i>
<i>Dracaena draco</i>	<i>Mentzelia aspera</i>	<i>Ziziphus mauritania</i>
<i>Cucumis dipsaceus</i>	<i>Momordica charantia</i>	Unidentified Mimosaceae
<i>Echium hypertropicum</i>	<i>Musa</i> spp.	Unidentified other
<i>Echium stenosphon</i>	<i>Nauplius smithii</i>	

**Table 5 – most common plant species in the Cape Verde warbler potentially suitable habitat, i.e. most common plants found on the sampled 10x10 m plots where the warbler was present and absent, in Santiago, Fogo and S. Nicolau between September and December 2014, with number of plots where they were found and average percentage cover if present; Mimosaceae refers to unidentified trees of this family. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**

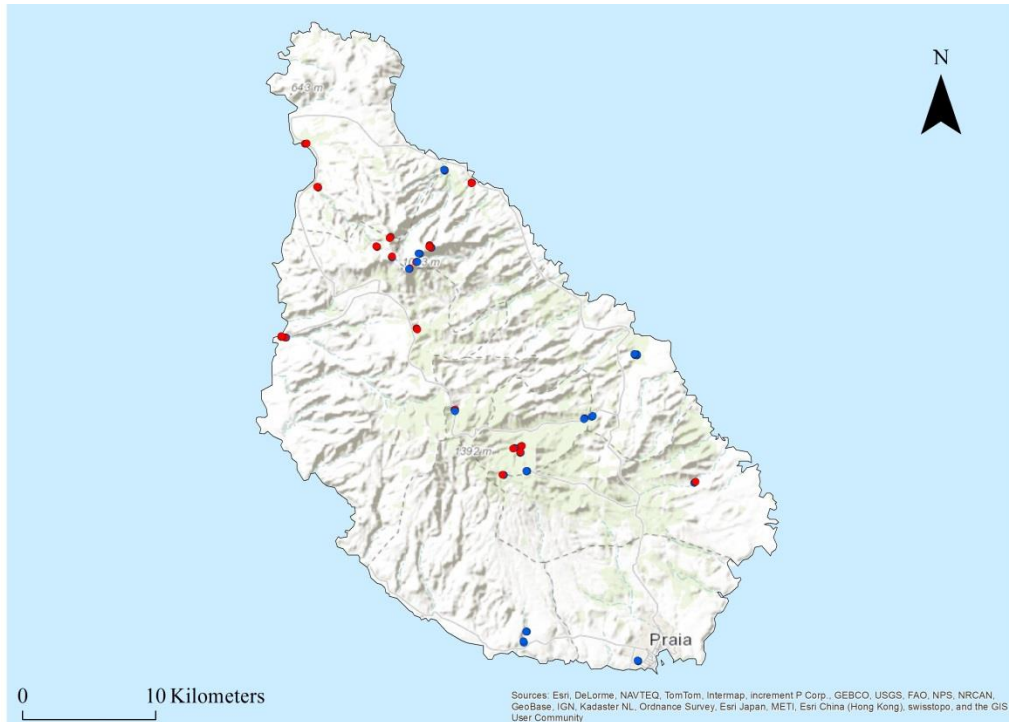
<b>Plant species</b>	<b>Plant type</b>	<b>Number of plots</b>	<b>Average percentage cover in plot</b>
<i>Arundo donax</i>	Exotic	50	47.1
<i>Coffea arabica</i>	Agricultural crop	33	48.33
<i>Eucalyptus</i> spp.	Forestry tree	31	48.23
<i>Grevillea robusta</i>	Forestry tree	17	29.12
<i>Hyptis pectinata</i>	Exotic	39	25.51
<i>Jacaranda mimosifolia</i>	Forestry tree	10	53
<i>Lantana camara</i>	Exotic	100	43.2
<i>Mangifera indica</i>	Fruit tree	34	51.47
Mimosaceae	Forestry tree	34	26.03
<i>Musa</i> spp.	Agricultural crop	25	38.8
<i>Pinus</i> spp.	Forestry tree	10	26
<i>Prosopis juliflora</i>	Forestry tree	18	69.72
<i>Saccharum officinalis</i>	Agricultural crop	36	66.94
<i>Zea mays</i>	Agricultural crop	48	34.79

### 3. Maps

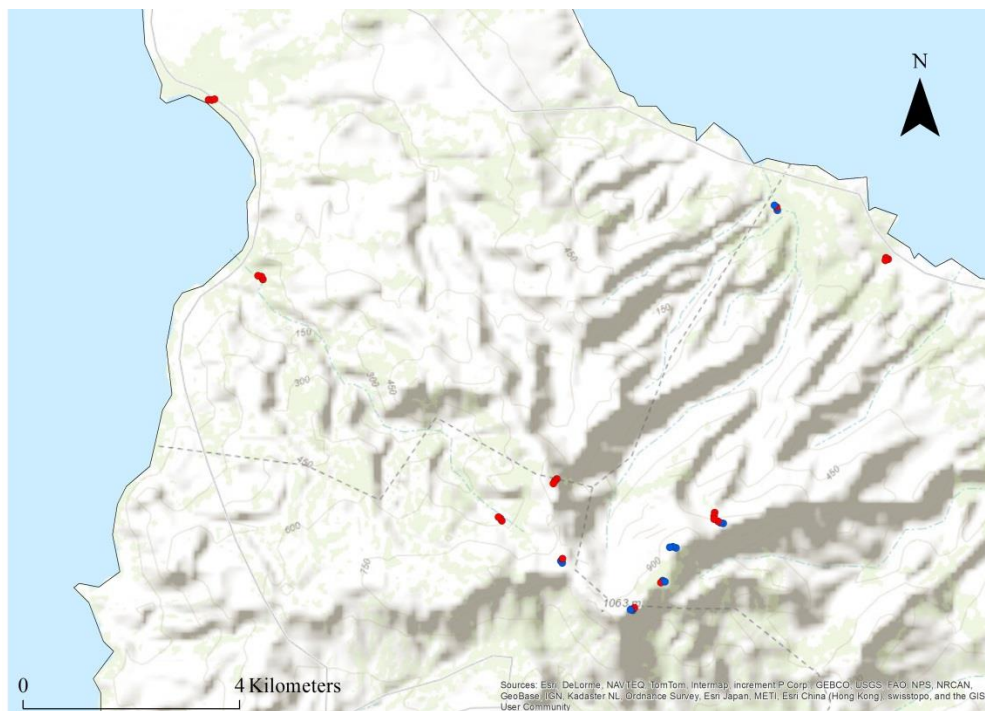
#### Habitat



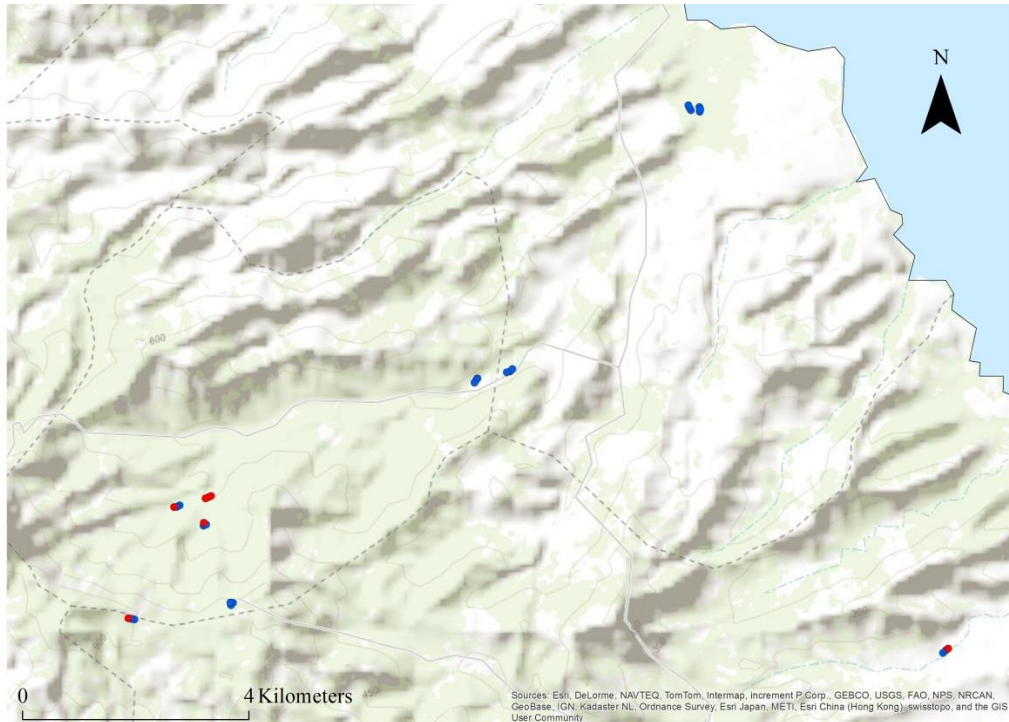
**Figure 1 – Overview of the sampled habitat plots where Cape Verde warblers *Acrocephalus brevipennis* were present (blue) and absent (red), during the breeding season of 2014. Some red points might overlap blue ones because of the proximity of the sampled plots. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**



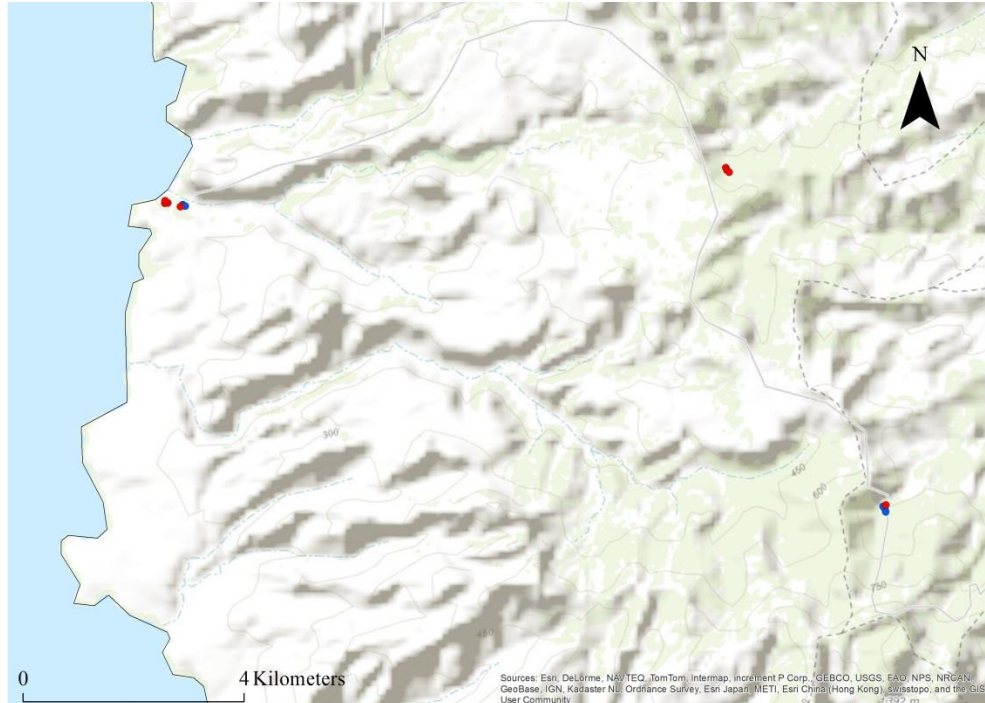
**Figure 2 – Overview of the sampled habitat plots where Cape Verde warblers *Acrocephalus brevipennis* were present (blue) and absent (red) on Santiago, during the breeding season of 2014. Some red points might overlap blue ones because of the proximity of the sampled plots. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**



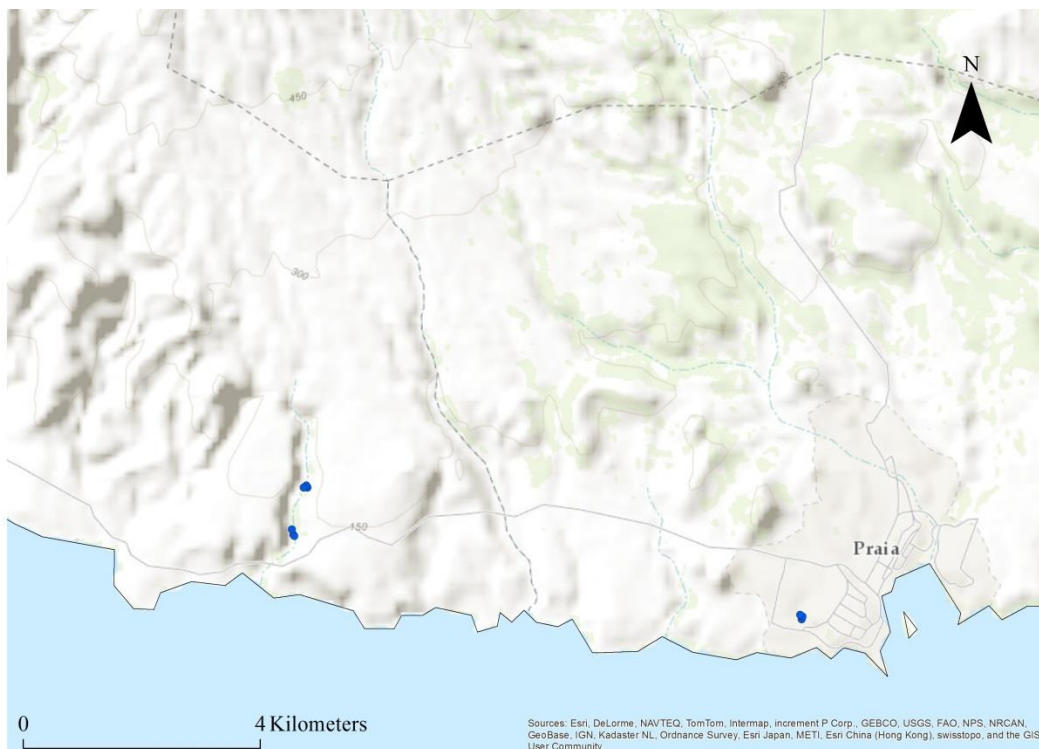
**Figure 3 – Sampled habitat plots where Cape Verde warblers *Acrocephalus brevipennis* were present (blue) and absent (red) on the North area of Santiago, during the breeding season of 2014. Some red points might overlap blue ones because of the proximity of the sampled plots. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**



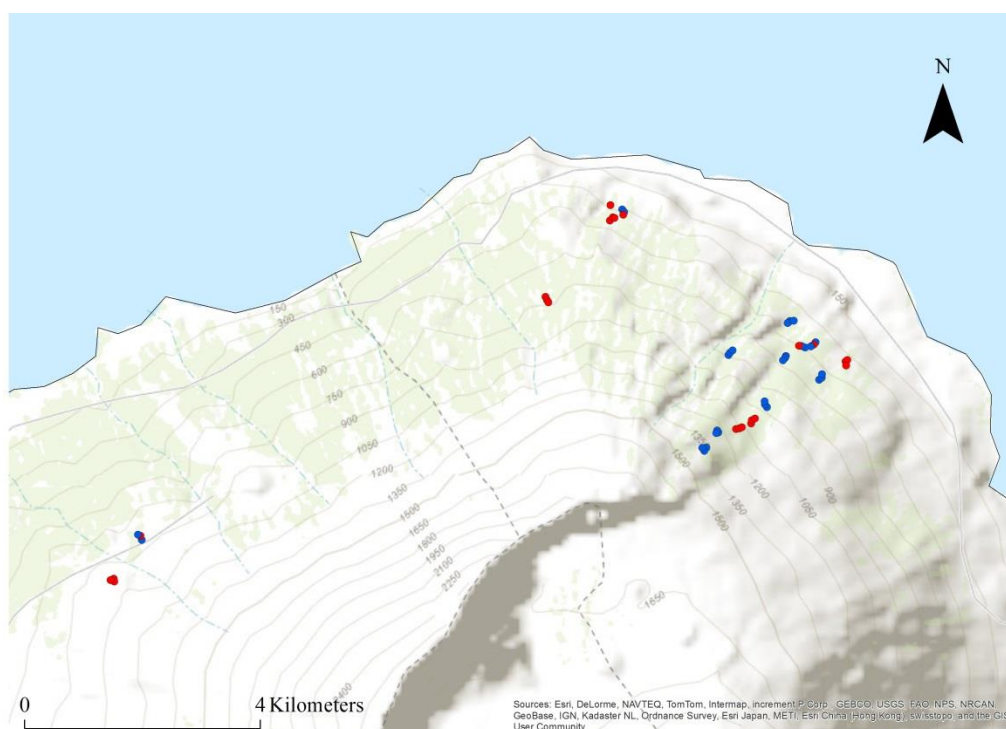
**Figure 4 – Sampled habitat plots where Cape Verde warblers *Acrocephalus brevipennis* were present (blue) and absent (red) on the Centre-East area of Santiago, during the breeding season of 2014. Some red points might overlap blue ones because of the proximity of the sampled plots. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**



**Figure 5 – Sampled habitat plots where Cape Verde warblers *Acrocephalus brevipennis* were present (blue) and absent (red) on the Centre-West area of Santiago, during the breeding season of 2014. Some red points might overlap blue ones because of the proximity of the sampled plots. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**

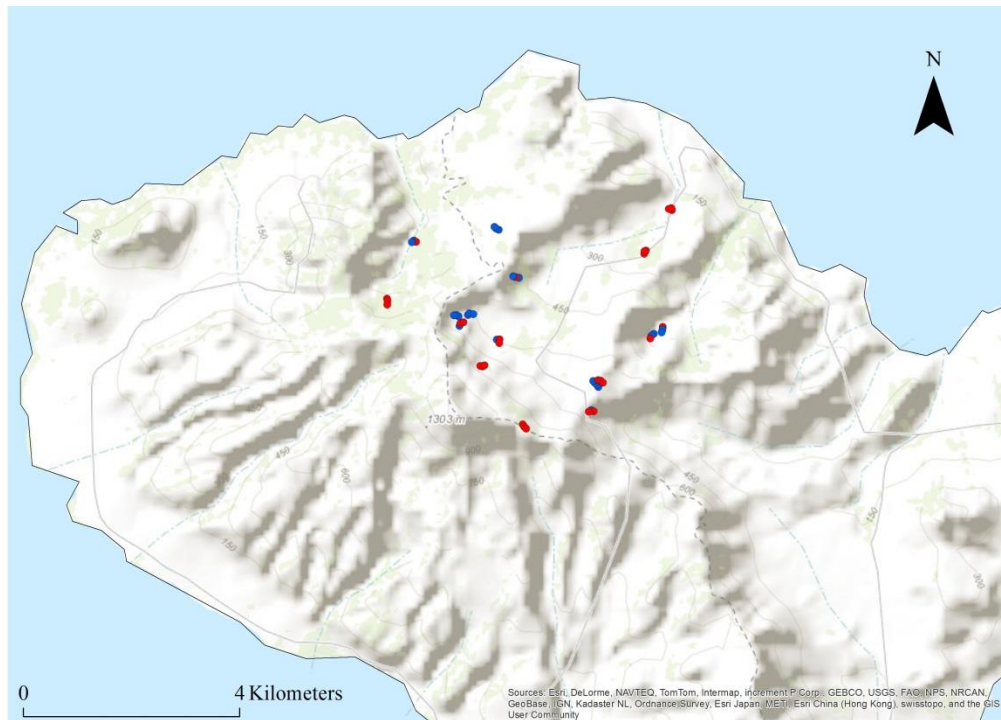


**Figure 6 – Sampled habitat plots where Cape Verde warblers *Acrocephalus brevipennis* were present (blue) and absent (red) on the South area of Santiago, during the breeding season of 2014. Some red points might overlap blue ones because of the proximity of the sampled plots. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**



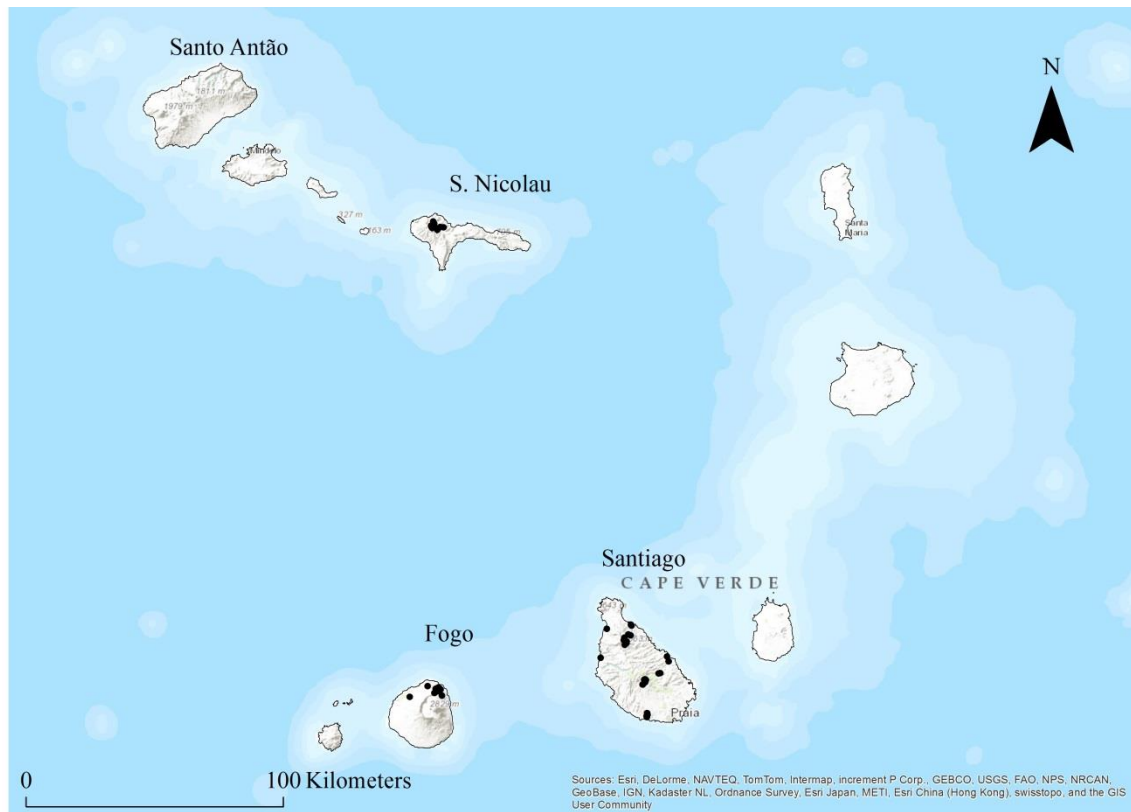
**Figure 7 – Overview of the sampled habitat plots where Cape Verde warblers *Acrocephalus brevipennis* were present (blue) and absent (red) on Fogo, during the breeding season of 2014. Some red points might overlap blue ones because of the proximity of the sampled plots. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**



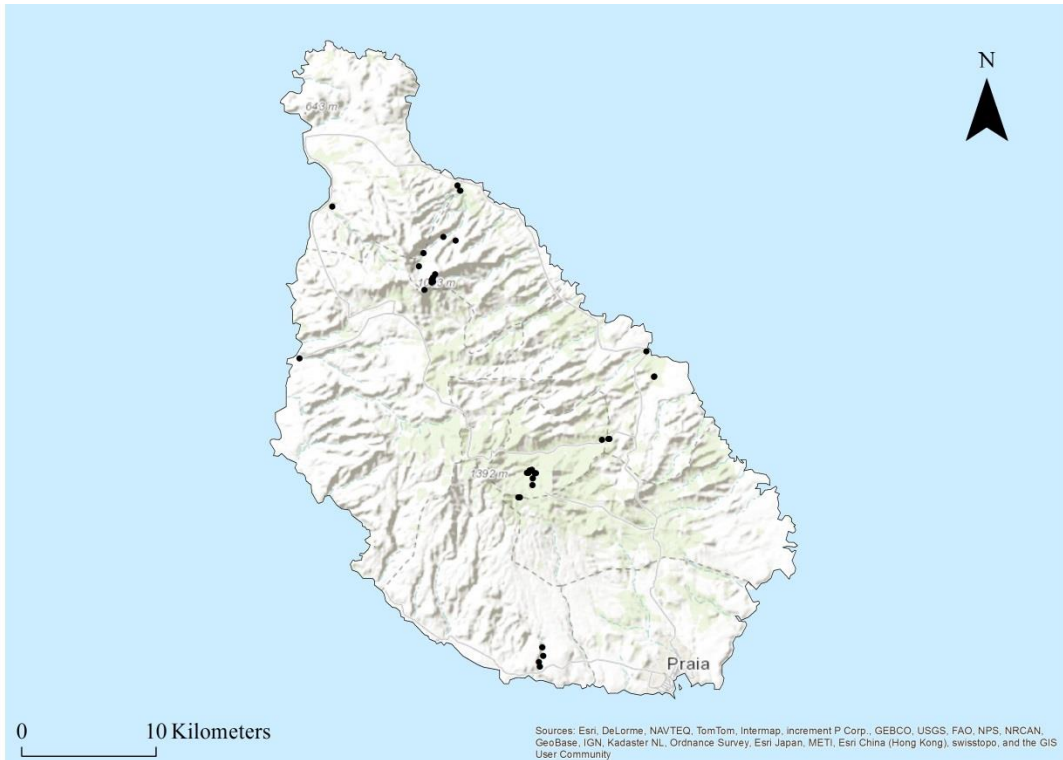


**Figure 8 – Overview of the sampled habitat plots where Cape Verde warblers *Acrocephalus brevipennis* were present (blue) and absent (red) on Fogo, during the breeding season of 2014. Some red points might overlap blue ones because of the proximity of the sampled plots. Modified from Batalha, H. R. (2017) Variation within and among populations of the endangered Cape Verde warbler: implications for conservation (Unpublished Doctoral dissertation).**

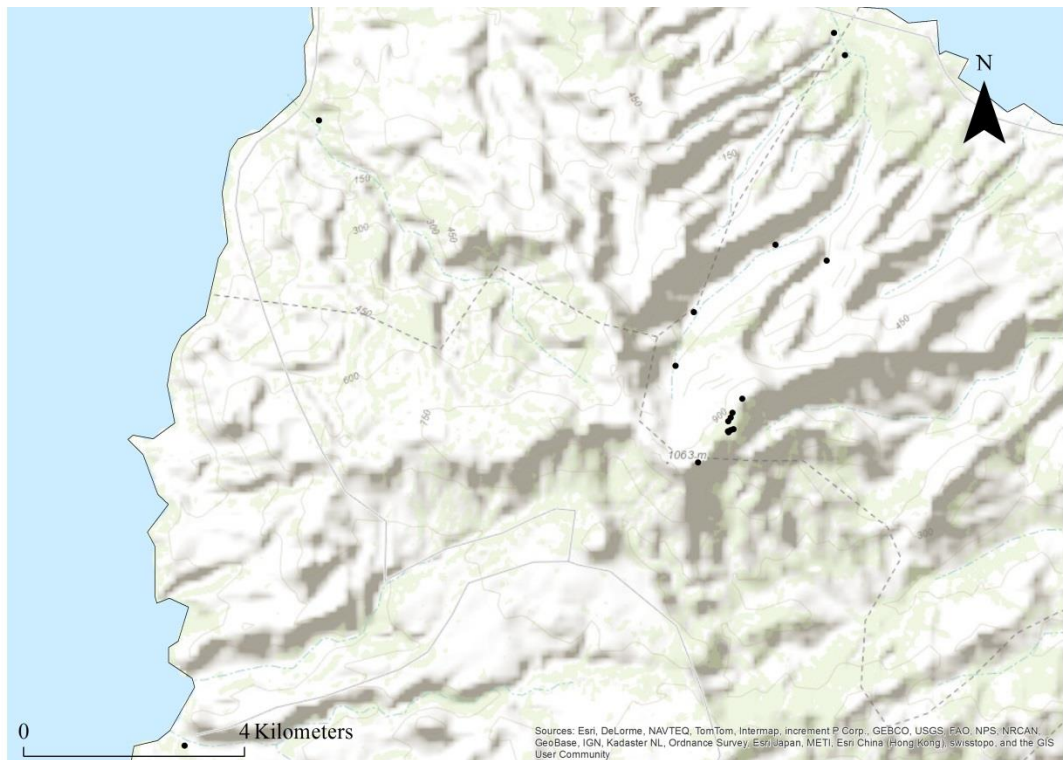
## Blood samples



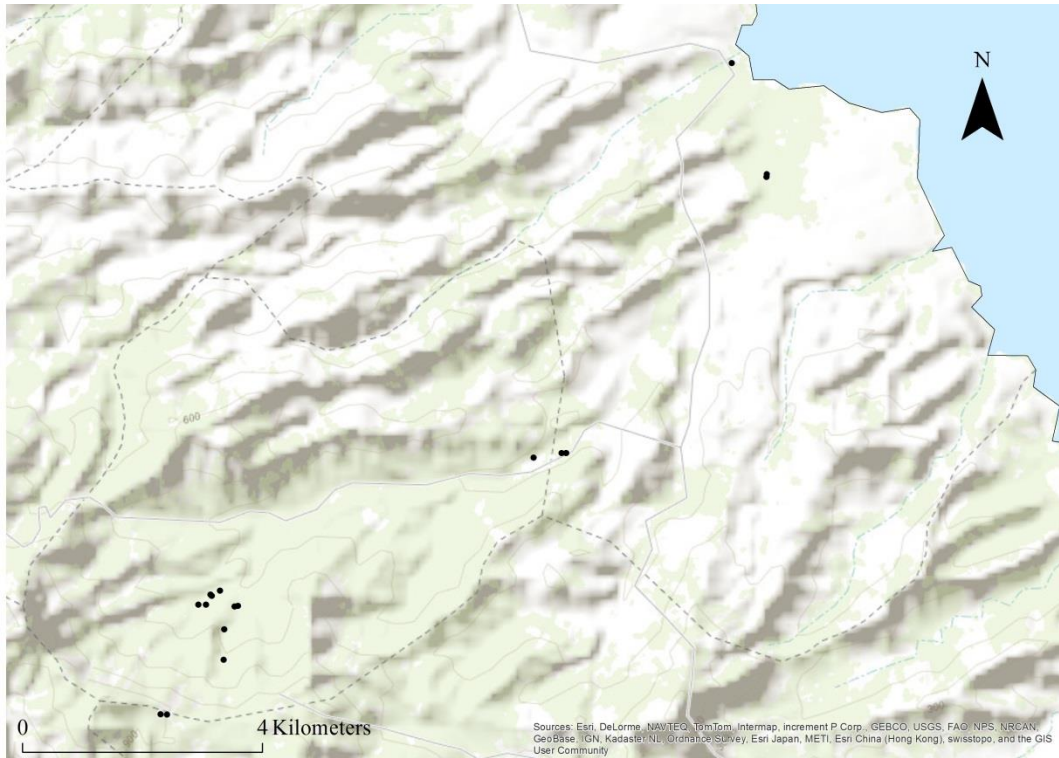
**Figure 9 – Overview of the sites where Cape Verde warblers *Acrocephalus brevipennis* were sampled, during the breeding seasons of 2013 and 2014. Modified from Batalha HR, Wright DJ, Barr I, Collar NJ, Richardson DS (2017) Genetic diversity and divergence in the endangered Cape Verde warbler *Acrocephalus brevipennis*. Conservation Genetics 18, 343-357.**



**Figure 10 – Overview of the sites where Cape Verde warblers were sampled on Santiago, during the breeding seasons of 2013 and 2014. Modified from Batalha HR, Wright DJ, Barr I, Collar NJ, Richardson DS (2017) Genetic diversity and divergence in the endangered Cape Verde warbler *Acrocephalus brevipennis*. Conservation Genetics 18, 343-357.**



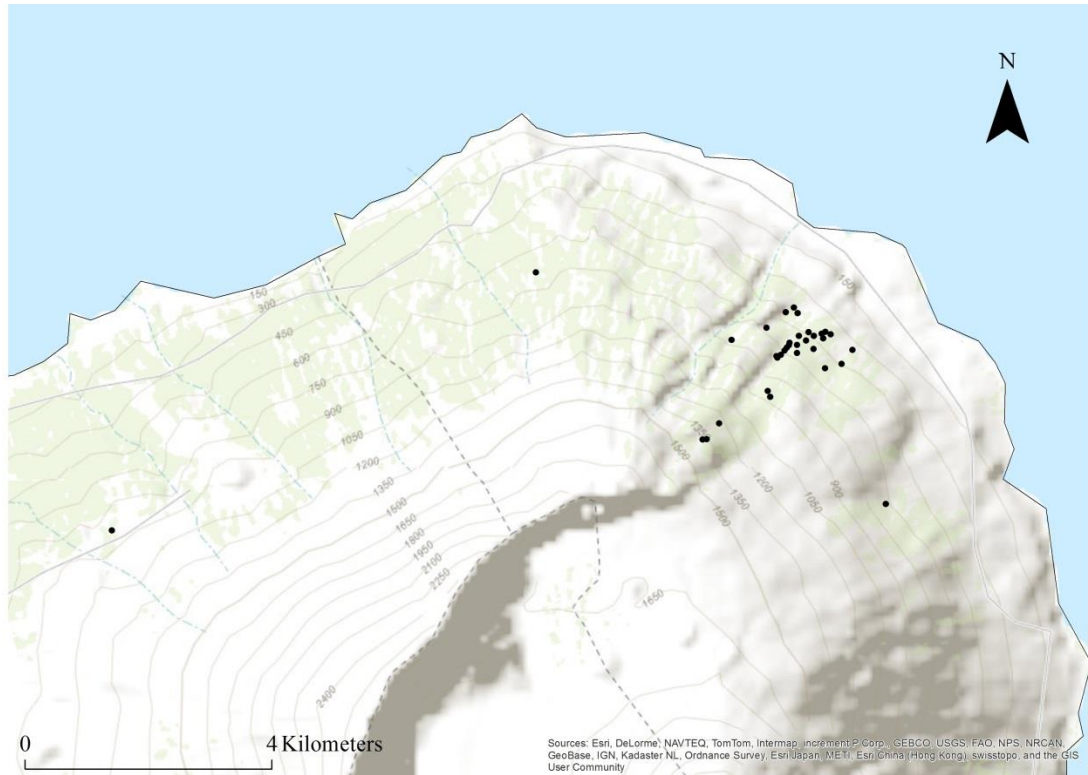
**Figure 11 - Sites where Cape Verde warblers were sampled in the North area of Santiago, during the breeding seasons of 2013 and 2014. Modified from Batalha HR, Wright DJ, Barr I, Collar NJ, Richardson DS (2017) Genetic diversity and divergence in the endangered Cape Verde warbler *Acrocephalus brevipennis*. Conservation Genetics 18, 343-357.**



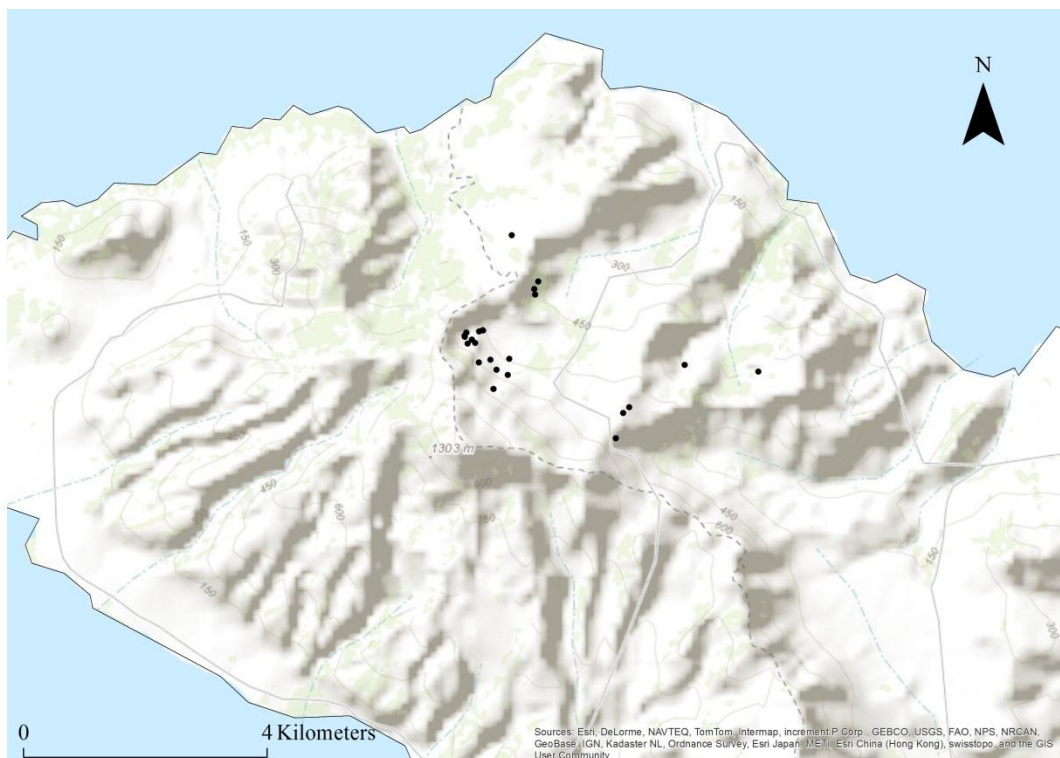
**Figure 12 - Sites where Cape Verde warblers were sampled in the Centre area of Santiago, during the breeding seasons of 2013 and 2014. Modified from Batalha HR, Wright DJ, Barr I, Collar NJ, Richardson DS (2017) Genetic diversity and divergence in the endangered Cape Verde warbler *Acrocephalus brevipennis*. Conservation Genetics 18, 343-357.**



**Figure 13 - Sites where Cape Verde warblers were sampled in the South area of Santiago, during the breeding seasons of 2013 and 2014. Modified from Batalha HR, Wright DJ, Barr I, Collar NJ, Richardson DS (2017) Genetic diversity and divergence in the endangered Cape Verde warbler *Acrocephalus brevipennis*. Conservation Genetics 18, 343-357.**

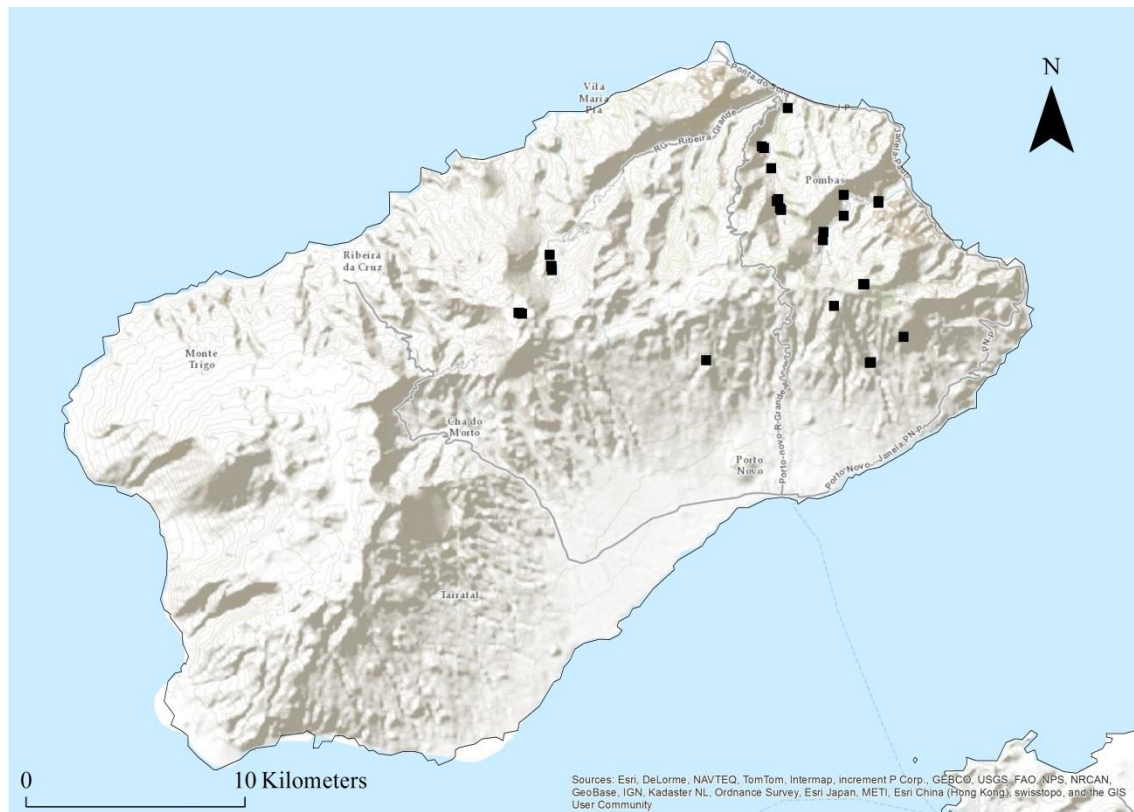


**Figure 14 - Overview of the sites where Cape Verde warblers were sampled on Fogo, during the breeding seasons of 2013 and 2014. Modified from Batalha HR, Wright DJ, Barr I, Collar NJ, Richardson DS (2017) Genetic diversity and divergence in the endangered Cape Verde warbler *Acrocephalus brevipennis*. Conservation Genetics 18, 343-357.**



**Figure 15 - Overview of the sites where Cape Verde warblers were sampled on S. Nicolau, during the breeding seasons of 2013 and 2014. Modified from Batalha HR, Wright DJ, Barr I, Collar NJ, Richardson DS (2017) Genetic diversity and divergence in the endangered Cape Verde warbler *Acrocephalus brevipennis*. Conservation Genetics 18, 343-357.**

## Santo Antão



**Figure 16 - Overview of the point counts with playbacks done on Santo Antão to detect the Cape Verde warbler *Acrocephalus brevipennis* in September 2014. No Cape Verde warblers were found on the island.**

## 4. Fieldwork photos

### Santiago



**Figure 17 – our Cape Verdean field assistant, Naya Sena, examining sampled Cape Verde warblers before releasing them on Santiago, November 2014. Photos by Helena Batalha.**



**Figure 18 – surveying the west side of the Natural Park of Serra Malagueta with the Park staff, November 2014. Photos by Helena Batalha.**





**Figure 19 – working with the staff of the Natural Park of Serra Malagueta, November 2014. Photos by Helena Batalha.**



Figure 20 – collecting habitat data with the staff of the Natural Park of Serra Malagueta, November 2014.  
Photos by Helena Batalha.



**Figure 21 – our team searching for Cape Verde warblers and collecting habitat data on Santiago, November 2014. Photos by Helena Batalha.**



**Figure 22 – field assistants Naya Sena and Torbjörn Blixt taking a break after a hard working day on Tarrafal and Chão Bom, Santiago, November 2014. Photos by Helena Batalha.**

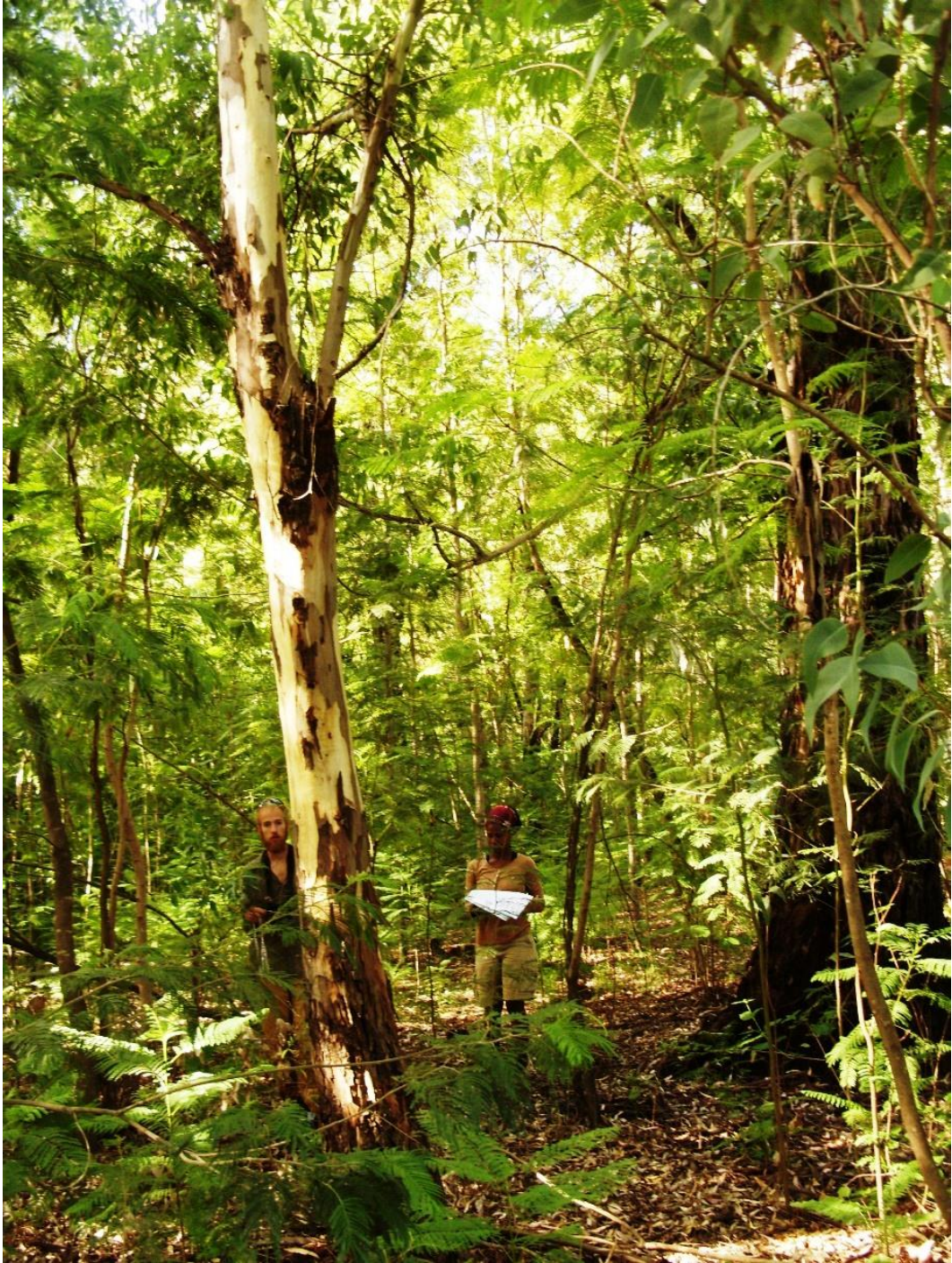
Fogo



Figure 23 – field assistant Naya Sena examining the sampled Cape Verde warblers before releasing them high in the northeastern slopes of Fogo, October 2014. Photos by Helena Batalha and Torbjörn Blixt.



Figure 24 – field assistant Naya Sena and Helena Batalha measuring a Cape Verde warbler high in the north eastern slopes of Fogo, October 2014. Photo by Torbjörn Blixt.



**Figure 25 – field assistants Naya Sena and Torbjörn Blixt recording habitat data in the forest of Monte Velha, Fogo, October 2014. Photo by Helena Batalha.**



**Figure 26 – field assistants Naya Sena and Torbjörn Blixt posing for photos during the exploratory descent from the forest of Monte Velha to the coffee plantations of Pai António, Fogo, October 2014. Photos by Helena Batalha.**

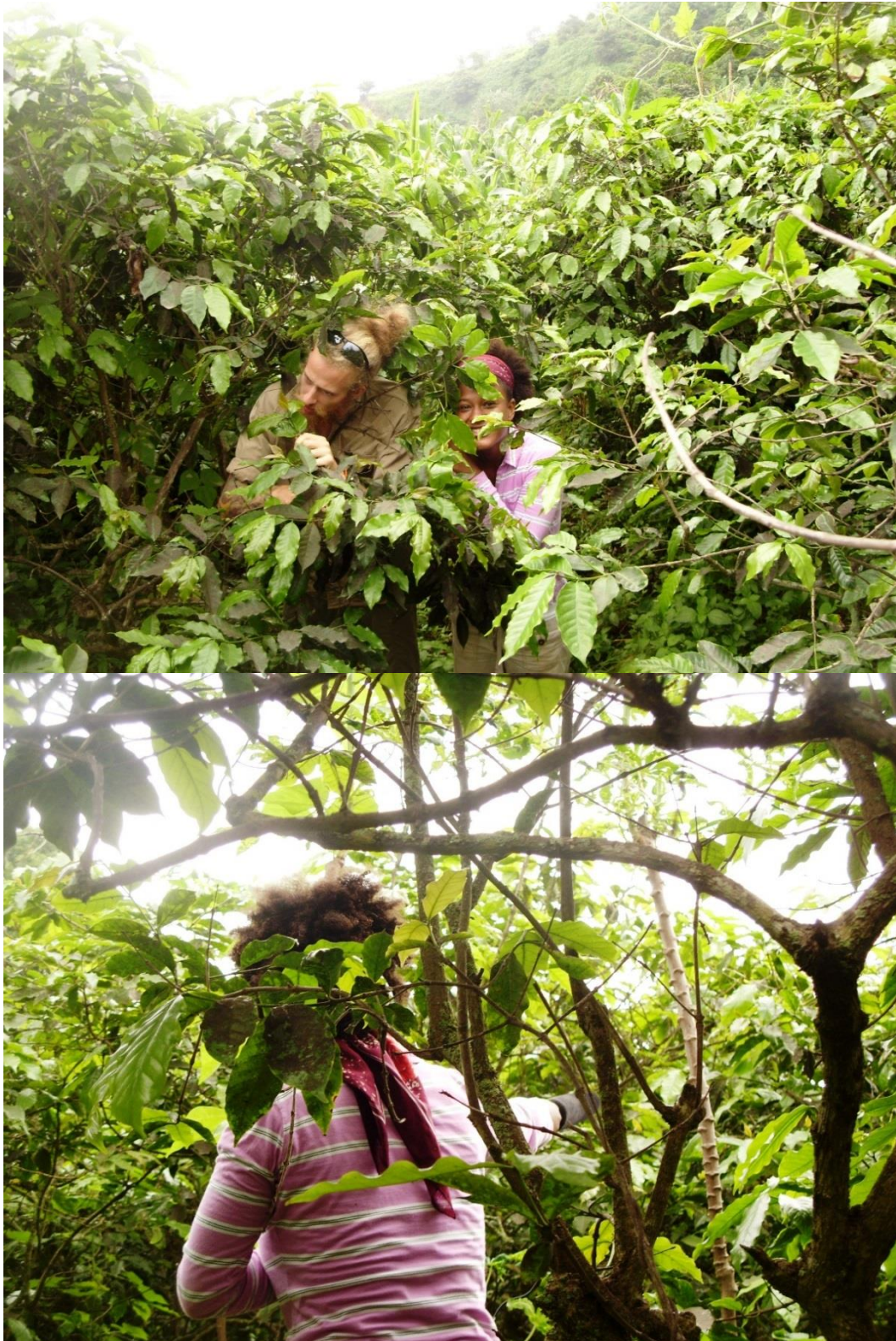


**Figure 27 – field assistant Naya Sena trying to identify a colour-ringed Cape Verde warbler in a mixed agricultural plantation, Fogo, October 2014. Photo by Helena Batalha.**



**Figure 28 – field assistants Naya Sena and Torbjörn Blixt searching for Cape Verde warblers in one of the areas of difficult access high in the north eastern slopes of Fogo, October 2014. Photo by Helena Batalha.**





**Figure 29 – field assistants Naya Sena and Torbjörn Blixt searching for Cape Verde warblers and Naya recording their song in a coffee plantation on Fogo, October 2014. Photos by Helena Batalha.**



**Figure 30 – Herculano Dinis, from the Natural Park of Fogo, examining the sampled Cape Verde warbler before releasing it in Corvo, Fogo, October 2014. Photo by Helena Batalha.**

S. Nicolau



**Figure 31 – Silvino Brito, from the Natural Park of Monte Gordo, after resighting a previously colour-ringed Cape Verde warbler in Canto Fajã, S. Nicolau, September 2014. Photo by Helena Batalha.**



**Figure 32 – Helena Batalha, field assistant Naya Sena and Silvino Brito, from the Natural Park of Monte Gordo, descending from Fragata after a search for Cape Verde warblers in the slopes of Canto Fajã, S. Nicolau, November 2014. Photo by Torbjörn Blixt.**



**Figure 33 – identifying plants in the forest of the Natural Park of Monte Gordo, S. Nicolau, November 2014. Photo by Helena Batalha.**



**Figure 34 –field assistant Naya Sena and Franciscana Sequeira, from the Natural Park of Monte Gordo, at the start of a search for Cape Verde warblers in the valley of Queimadas, S. Nicolau, November 2014. Photo by Helena Batalha.**



**Figure 35 –field assistant Naya Sena and Silvino Brito, from the Natural Park of Monte Gordo, at the end of the steep climb to access the valley of Covoada, overlooking Canto Fajã and Fajã de Baixo, and Naya Sena at the end of the same climb but coming back from the valley of Covoada (in the background), S. Nicolau, November 2014. Photo by Helena Batalha.**



**Figure 36 – Silvino Brito, from the Natural Park of Monte Gordo, searching for a Cape Verde warbler in the only territory found so far in the valley of Covoada, S. Nicolau, November 2014. Photo by Helena Batalha.**



**Figure 37 – Professor David S. Richardson, from the University of East Anglia, and field assistant Naya Sena descending from the team’s accomodation in the Natural Park of Monte Gordo S. Nicolau, and Naya Sena and Torbjörn Blixt on their final descent from the same place, November 2014. Photos by Helena Batalha.**



## Santo Antão



**Figure 38 – our team starting the descent to Paul with director Emitório Ramos and Gilda Monteiro, from the Protected Areas of Santo Antão, in search of Cape Verde warbler, on Santo Antão, September 2014 . Photos by Torbjörn Blixt.**



**Figure 39 – Helena Batalha and Gilda Monteiro in Paul taking a break from a search for Cape Verde warblers, on Santo Antão, September 2014 . Photo by Torbjörn Blixt.**



**Figure 40 – Helena Batalha double checking the GPS coordinates after a point count to detect Cape Verde warblers, on a valley of Santo Antão, September 2014 . Photo by Torbjörn Blixt.**

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