

Camera Trap Data Processing  
User Manual

- *Supplement to* -

**Harris, G., R. Thompson, J. L. Childs and J. G. Sanderson. 2010. Automatic storage and analysis of camera trap data.**  
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## **INTRODUCTION**

The following user manual contains the detailed steps necessary for generating a common format for labeling, storing, sharing and subsequently analyzing information gained from camera traps. This document forms a supplement to the publication: *Harris, G., R. Thompson, J. L. Childs and J. G. Sanderson. 2010. Automatic storage and analysis of camera trap data. xxx....* This publication is the proper reference for citation purposes.

## **DATA RETRIEVAL, RELABELING, AND STORAGE**

### **Summary**

- I. Set up a file structure to hold the images.
- II. Visit a camera trap, remove the memory card, and store the images in a temporary folder.
- III. Relabel all the files in the temporary folder simultaneously with the date and time the image was recorded (automated).
- IV. For each image file, identify the species, count the number-of-individuals of each species recorded, and store the file in the proper location/species/number-of-individuals folder.
- V. Return to step II above until all camera traps have been visited and images processed.

### **Five Detailed Steps**

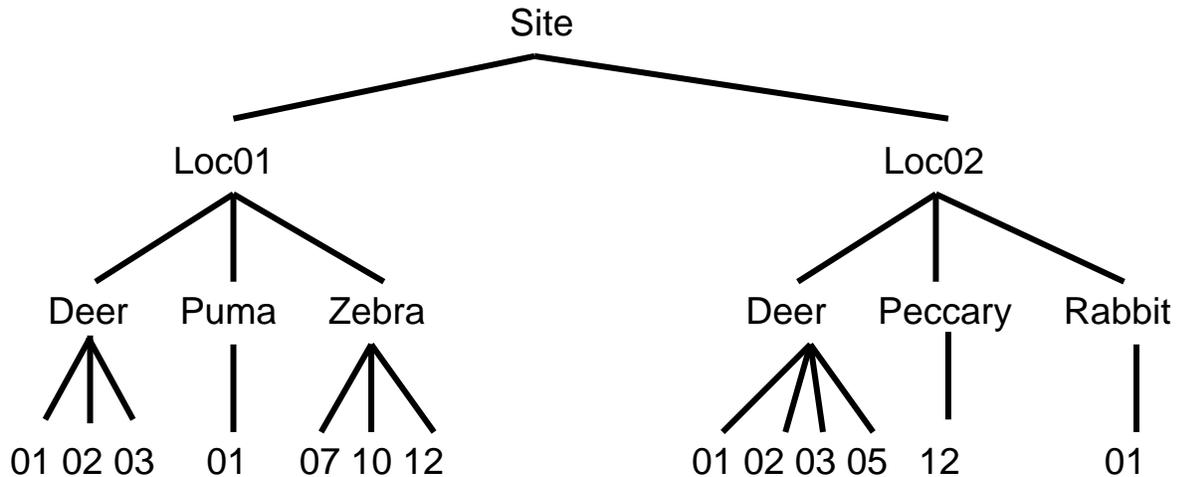
#### **I. Set up a file structure to hold the images.**

Each image from a camera trap will ultimately be stored in a Site / Location / Species / # folder. Figure 1 exemplifies such a file structure. For example, an image of 10 zebra would be placed in the directory Site / Loc01 / zebra / 10. (Note that location directories can be copied, pasted, and relabeled). Create or delete folders as needed. More explicitly:

- (1) Site refers to the general area where the camera traps are operating.
- (2) Locations refer to places where a camera trap is/was set. Locations might be Loc01, Loc02, or have names like South Wash or Arroyo Seco (or identified by UTM coordinates). Location names are always unique (in our program, they are limited to 25 characters).
- (3) For each location, each species captured by the imagery is placed in a unique folder, named by that species (in our program names are limited to 25 characters).
- (4) Folders within each Species folder are labeled with the number-of-individuals in the image. For example, an image with 1 animal would be in folder name "01". An image with 5

animals of the same species would be in folder “05”. Numbers need not be sequential, and it does not matter if some folders are empty.

(5) Each Location folder can contain a folder “Unknown” (for species) with the number-of-individuals folder “99” where all unidentified images are stored.



**Figure 1:**

Example directory structure for storing and organizing imagery gained from camera traps.

## **II. Visit a camera trap, remove the memory card, and store the images in a temporary folder.**

Storing all the images from a memory card in a temporary location folder and then relabeling them in step III prevents subsequent loss of image files. Image file counting resets to zero when images are moved from the memory card. Subsequent file moves can over-write existing files. Relabeling the image files with their date and time makes the image files unique and prevents files from being over-written.

### **IIIa. Digital images. Relabel all the files in the temporary folder simultaneously with the date and time the image was recorded.**

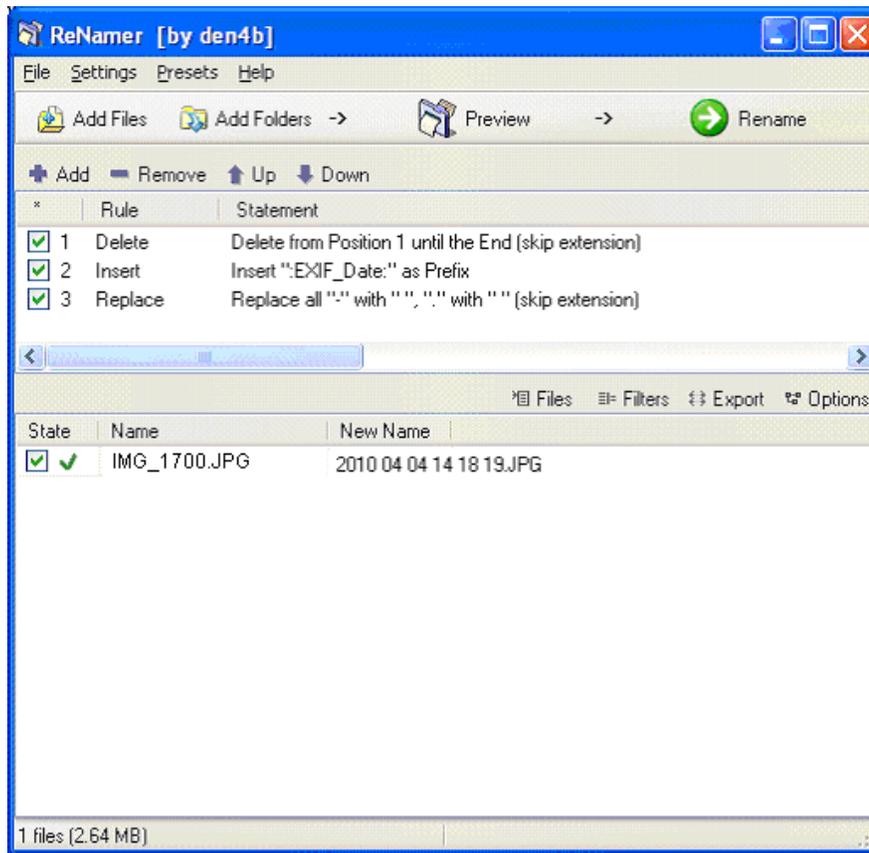
The freeware program ReNamer is used to simultaneously relabel all images in the temporary location folder. ReNamer is downloaded from:

<http://www.snapfiles.com/downloads/denrenamer/dldenrenamer.html>

#### **Using ReNamer**

To begin, make a copy of a file to use as a test case. Perform the following steps on the test file. When the file is properly relabeled, save the steps in ReNamer. These steps can then be automatically applied subsequently without the need to reenter them. The following steps using ReNamer are visualized in Figure 2.

- (1) Open ReNamer by double clicking on the icon.
- (2) Drag and drop an image file, group of image files, or a folder of images into the lower frame of ReNamer. The image files are listed.
- (3) Click "+Add" to add the first rule. From the drop down list select "Delete", select "Till the end", skip extension. Click Add Rule. This deletes the name of the file leaving the extension. Don't worry that it appears as if only one such file had the label deleted.
- (4) Click "+Add" to add the second rule. Select "Insert", then click the yellow lightning bolt Insert Meta Tag, and select from the drop-down list "EXIF\_Date". Then click the green check Insert. Click "+Add Rule". Now click on Preview at the top. The new names of the files should appear with the date and time that the image was recorded.
- (5) Click "+Add" to add the third rule. Select "Replace". In the Find: box enter "-", and in the Replace: box enter a space or blank with the space bar on the keyboard. Back in the Find: box, click on the "+" sign to the right of the box, and in the Find: box enter ".", and then in the Replace: box enter another space. Repeat this for all characters other than numbers. This replaces all the non-number characters with a space. The names of all the files appear as: yyyy mm dd hr mn sc.jpg (or JPG).
- (6) Click on Preview on the upper right of the ReNamer box and the new names should appear. If the file label does not appear as yyyy mm dd hr mn sc, you might need to add a rule to delete a few more characters or add a space.
- (7) To the right of Preview click on the green Rename right arrow and the files are relabeled and saved.
- (8) From the top menu list select "Presets", save as, and then give your rule set a name like "MyRules". You can then use the rules again without re-entering them.



**Figure 2:** A file has been placed into ReNamer, three rules have been added, and the file successfully renamed with the date and time that the image was recorded.

**IIIb. Film images. Relabel all the files in the temporary folder by hand with the date and time the image was recorded.**

Unfortunately for film images this step must be done by hand since the year and month are inferred and the date and time are imprinted on the image. Subsequent steps are the same.

**IV. For each image file, identify the species, count the number-of-individuals of each species recorded, and store the file in the proper location/species/number-of-individuals folder.**

Open each relabeled image file in the temporary folder, identify the species recorded, count the number-of-individuals, and move the file to the proper location/species/number-of-individuals folder. In the event that two or more species are recorded, store a copy for each species in the proper species/number-of-individuals folder.

**VI. Return to step II above until all camera traps have been visited and images processed.**

Note that at no time was a user required to enter data by hand. Also, if a digital image was manipulated and subsequently saved, it could have lost the original EXIF tag, which indicates the date and time that the image was actually taken.

## DATA CREATION AND ANALYSIS

### I. Data creation

#### Creation of *AllFoldersFiles.txt*

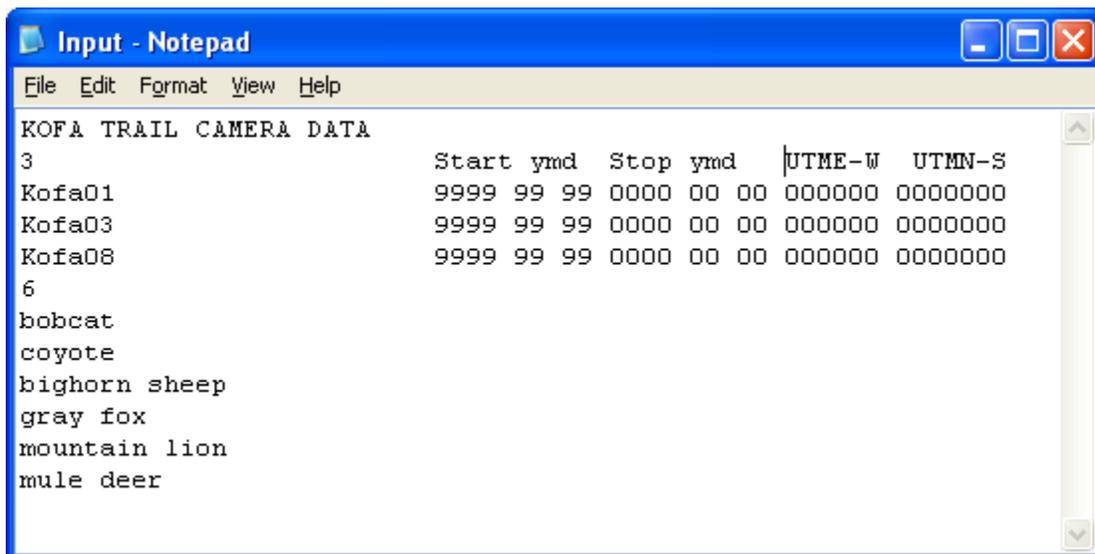
Open the command window (the black window where commands are typed) by going to “Start – Program – Accessories – Command Prompt”. Use the “chdir” command to change directories to the folder that contains all the location folders (for example chdir C:\Site). In the example below, the site is known as “Kofa”. Enter the command:

```
dir /s Kofa > AllFoldersFiles.txt
```

This creates a complex but structured text file list of all folder names and locations and the files within them. The text file *AllFoldersFiles.txt* is found in the folder that contains the Kofa folder.

#### Editing *Input.txt*

The data creation program reads *AllFoldersFiles.txt* and produces two text files. The first, *Input.txt*, contains the site name, the number of locations, a list of locations, the number of species, and the list of species. It defaults the camera trap start and stop times and also the UTM coordinates of each location. This file can then be edited by the user. An example with 2 sites and 4 species (including Unknown) is as follows. Note the start and stop year, month, and day (YMD) were defaulted and could be edited if any are known (Fig. 3).



**Figure 3:** The file *Input.txt* is automatically produced by the data creation program. The start and stop dates and UTM co-ordinates appear as place holders for each location that can be edited or remain unchanged if they are unknown.

Any species and locations can be deleted from *Input.txt* and so not included in camera trap data analysis. For instance, the species “bobcat” could be deleted, and the number of species reduced from 6 to 5. The folder “Unknown/99” is usually reserved for unidentifiable species recorded in poor images. Unknown therefore appears in *Input.txt* and can be deleted.

The second text file, *AllPictures.txt*, is a list of all image files that are labeled with the location name, species name, year, month, day, hour, minute, second, and number-of-individuals. Note that location and species names are 25 characters, left justified and blank filled:

```
Loc01                Deer                2009 11 27 13 55 45 01
```

*AllPictures.txt* can be imported and stored by a spreadsheet such as Excel. *AllPictures.txt* and *Input.txt* contain all the information used by an analysis program to complete a full analysis of all camera trap data.

### **SPREADSHEET CAMERA TRAP DATA**

Much camera trap data is presently stored in spreadsheets. In this case, the spreadsheet functions can be used to produce the *AllFoldersFiles.txt* that contains a list of images in the form above. The type of naming formats can vastly differ, so we do not give an example of how to produce the format above from existing spreadsheet data. However, we have not yet found an example of spreadsheet data that cannot be easily converted and stored in the text form identical to the above. For Excel, typical commands include “Find, Replace, Text to Columns and &. The file *Input.txt* is easily created as well.