TETRA 2.0 – User Guide

DATA VISUALISATION SYSTEM

Version 2.0

| FEBRUARY 2017

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Introduction

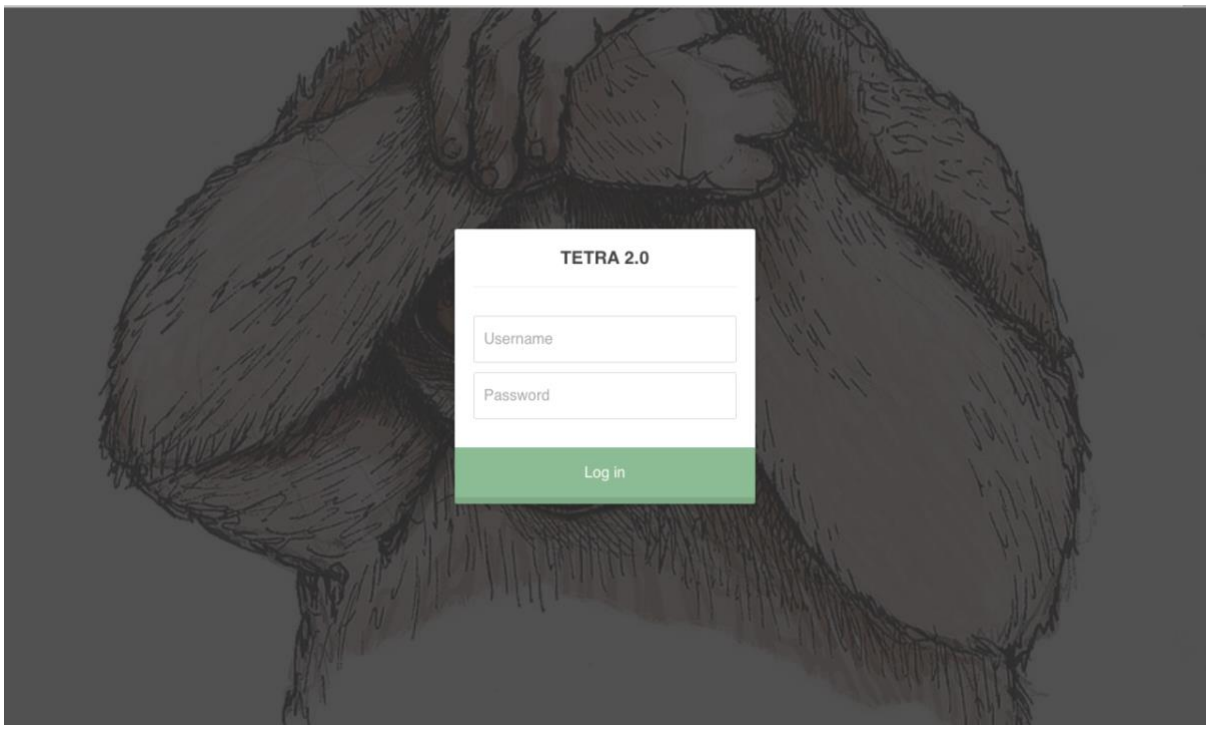
Tetra, a web-based database and data visualisation system for Animal Conservation Project, is a website developed to enable researchers to store and visualise patterns and information collected from the animal under study.

The purpose of this user guide is to make the users aware of the variety of features available within the new version of Tetra. The guide will cover Map View, Graph View, Uploading Data and Adding animal. The user is required to have basic knowledge of operating computers and partial knowledge of the data being utilised by the LFP team.

Logging In

Prerequisite

The user must enter a valid **Username** and **Password** provided by system administrator.



Process

1. Enter the **Username** and **Password**, where password text field is case-sensitive
2. Click **Log in** button

Result

Successful

Successful login credentials will redirect the user to GUI system and open up the **Map Analysis** page. However, the navigation bar view will vary depending on the administrative rights of the user.

Unsuccessful

Unsuccessful login details will redirect back to the login page.

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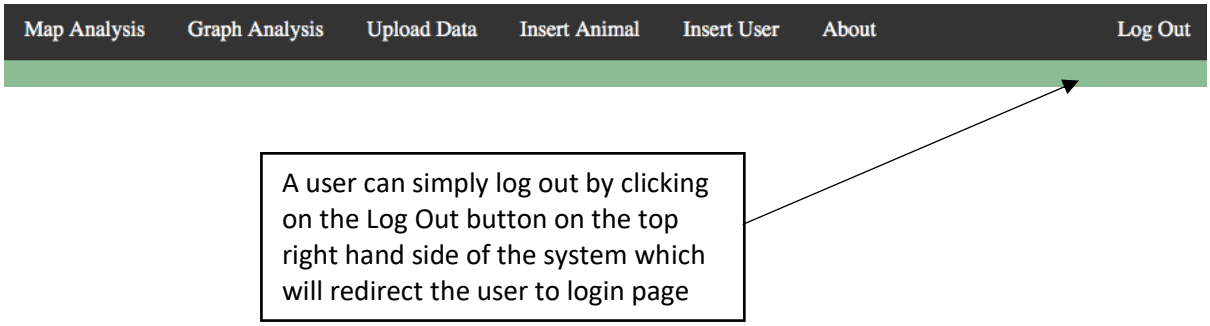
Log Out

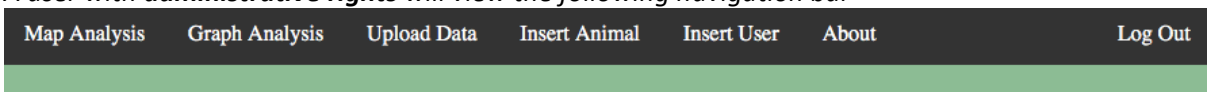


Navigation

A navigation bar can be viewed on top of a system once the user has successfully logged in. A user with administrative rights has been provided extra functionalities such as uploading and deleting data, insertion and deletion of animals and users.

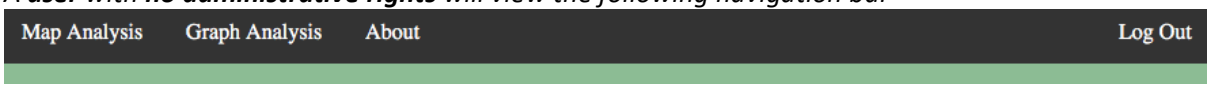
Administrator View

*A user with **administrative rights** will view the following navigation bar*



User View

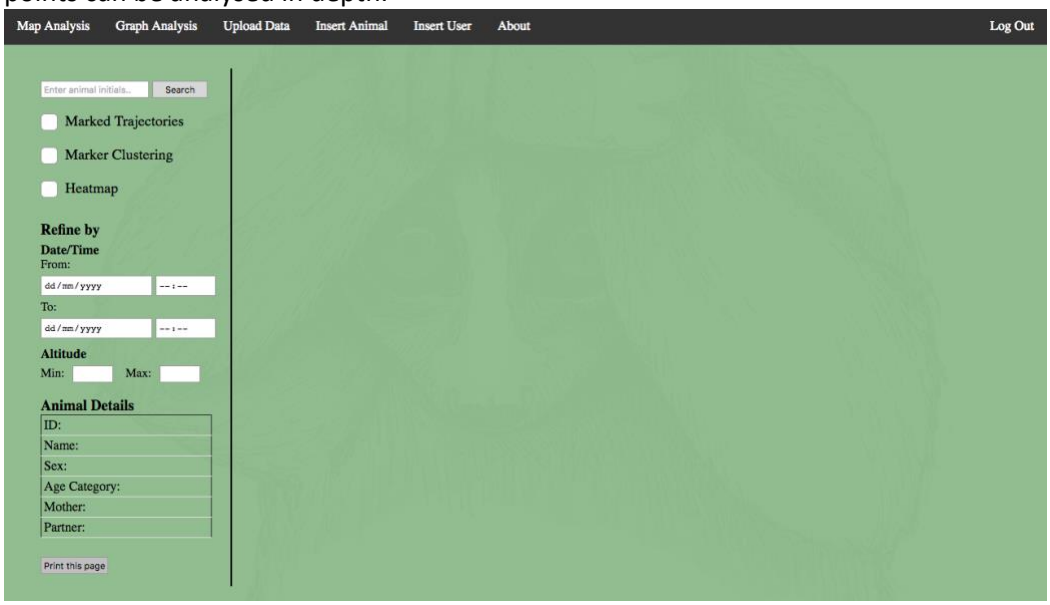
*A **user** with **no administrative rights** will view the following navigation bar*



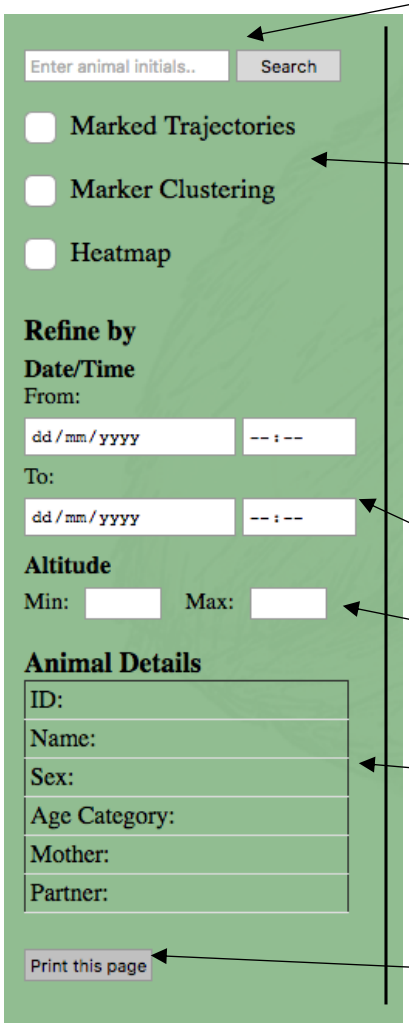
Administrative rights can be given to a user when inserting a new user to records, for more information visit **Insert User**.

Map Analysis

The **Map Analysis** page is used as a homepage, this is where the animal tracks and data collection points can be analysed in depth.



Map Side Panel



Search Box: Enter animal initials here and the click search in order to display trajectory on the map.

Display Options: User can select from the following checkbox options to display the animal collected data in different format. If none of the checkbox options is selected, then only lines of trajectories are displayed.

- Marked Trajectories – Lines with marked data points
- Marker Clustering – Marked data point only
- Heatmap – Heatmap of the data points

Refine by: The animal data results can also be refined by Date, Time and Altitude. The search system has been made very flexible therefore, the user has the flexibility of selecting multiple refine options simultaneously.

- Data/Time - Refine search results 'From' or/and 'To' particular date and time
- Altitude: Refine search results by minimum and/or maximum altitude

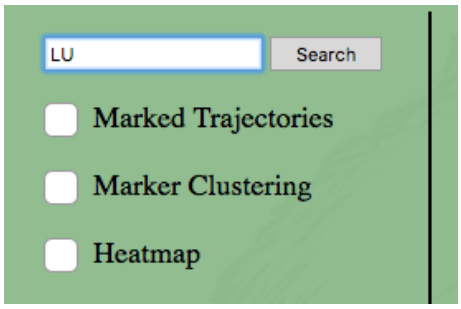
Animal Details: Upon successful search, the animal details are provided on the bottom of the panel for the convenience of user research

Print: Enable the user to print the page with data visualisation

Map Display

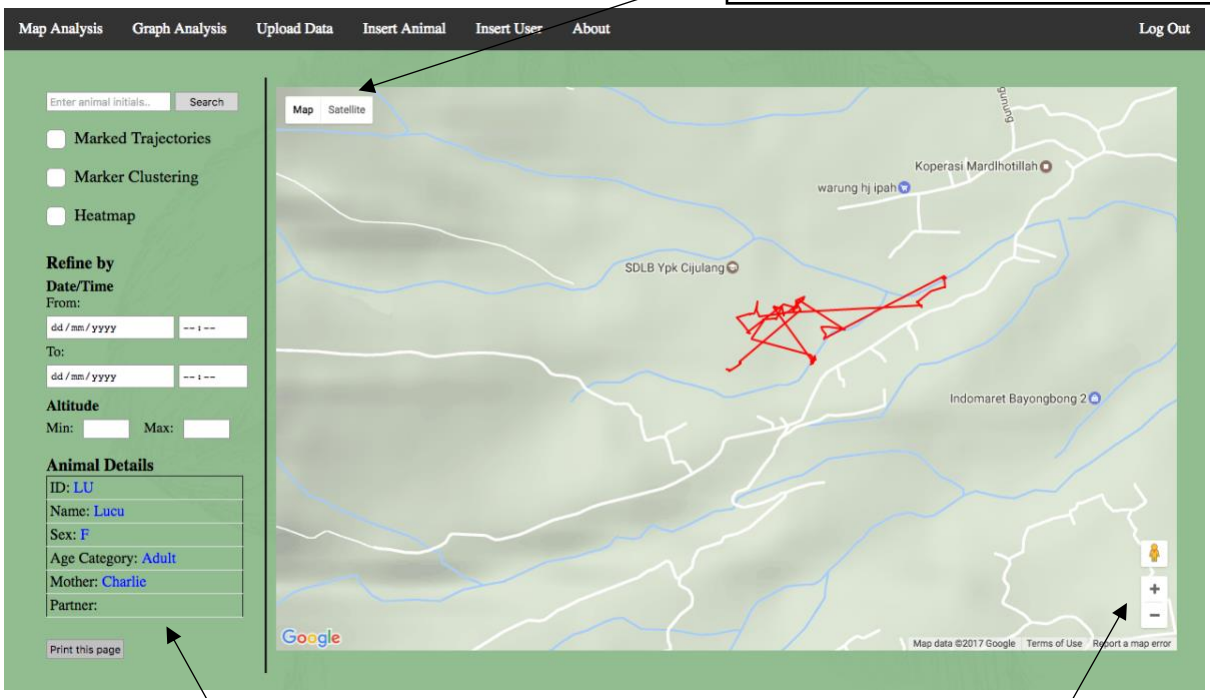
Line Trajectories

From the side panel, the user must enter animal initials within the search box and click the **Search** button. For example: Enter 'LU' with the text field, which are the initials of the animal by the name of 'Lucu' and then click the **Search** button.



This will display line trajectories of the animal 'Lucu' on the Google Map.

Click satellite to view data on satellite display instead.

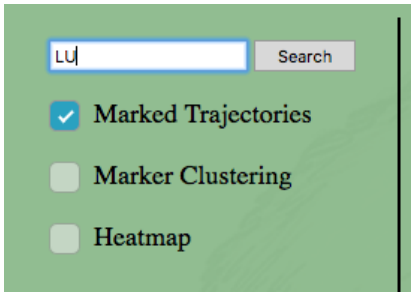


All of the details related to the searched animal will be displayed within the table.

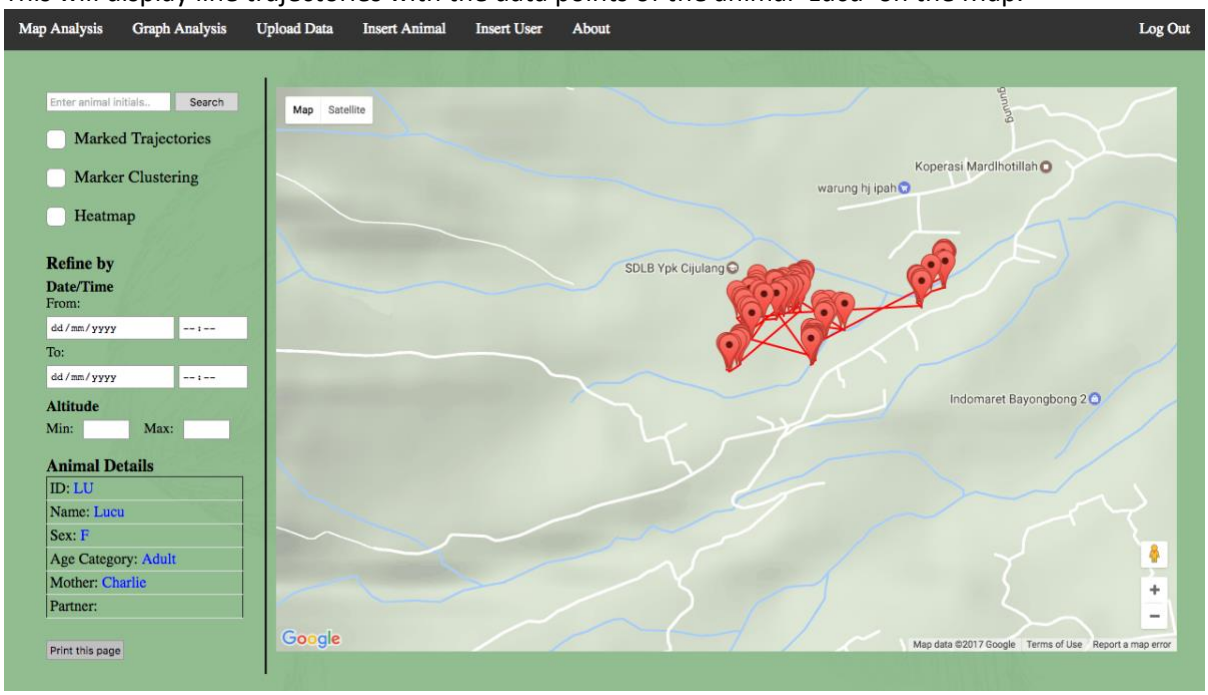
User may zoom-in or zoom-out on to the Google map integrated with the animal trajectories.

Marked Trajectories

In order to display trajectories with marked data points, the user must enter animal initials and select the ‘Marked Trajectories’ option. For example: Enter ‘LU’ within the text field and select the option ‘Marked Trajectories’ and then click the **Search** button.

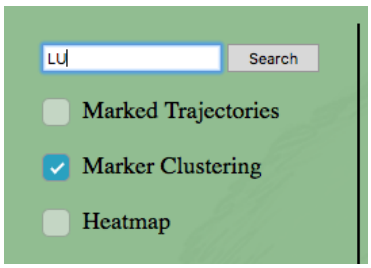


This will display line trajectories with the data points of the animal ‘Lucu’ on the Map.

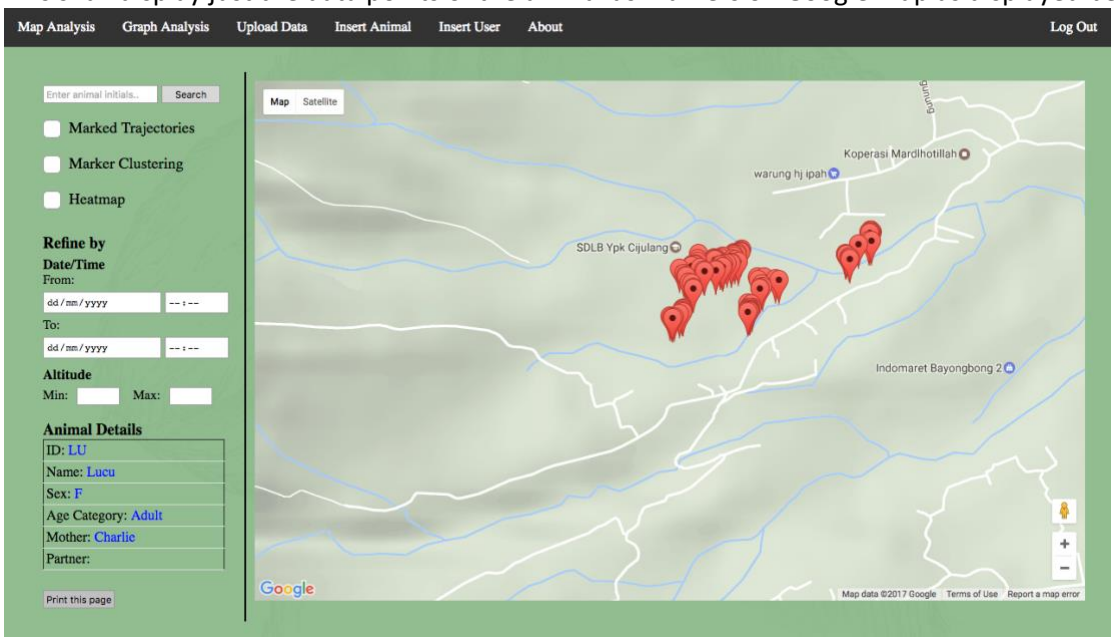


Marker Clustering

To display just marked data points, the user must enter animal initials and select the ‘Marker Clustering’ option. For example: Enter ‘LU’ within the text field and select the option ‘Marker Clustering’ and then click the **Search** button.



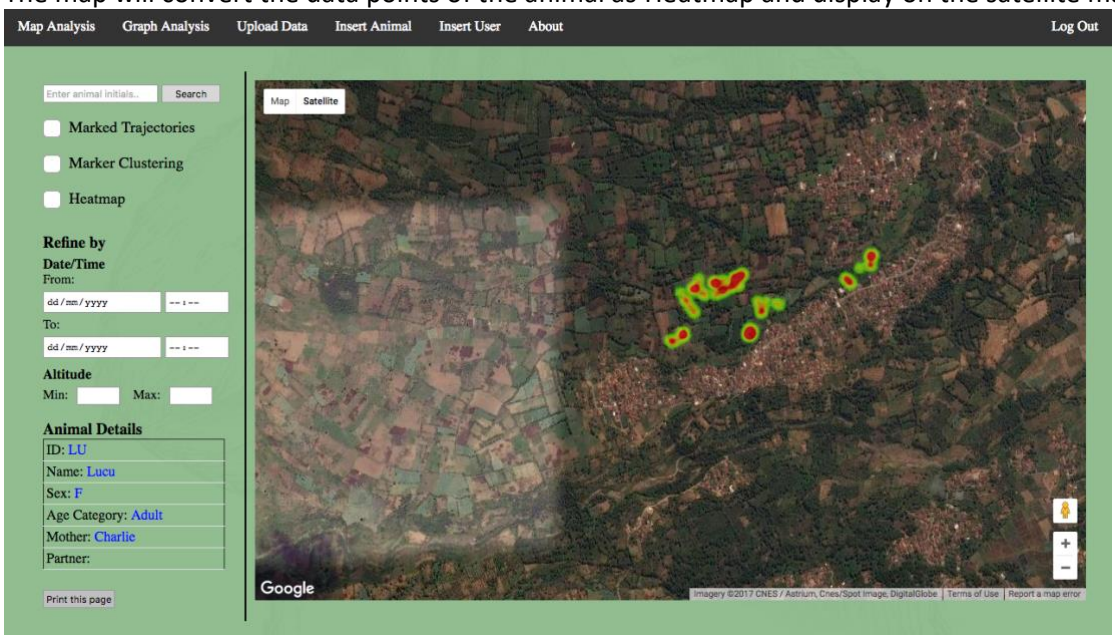
This shall display just the data points of the animal as markers on Google map as displayed below.



Heatmap

To visualise the animal data as a Heatmap, the user must enter animal initials and check the 'Heatmap' option. For example: Enter 'LU' within the text field and select the option 'Heatmap' and then click the **Search** button.

The map will convert the data points of the animal as Heatmap and display on the satellite map.



Prerequisite

In order to view the data, appropriate GPS location file which is required to be analysed should be uploaded. The user must enter a valid **Animal Initials** which exists within the database system (GPS location and animal data can be inserted by admin user via **Upload** and **Insert Animal** page respectably).

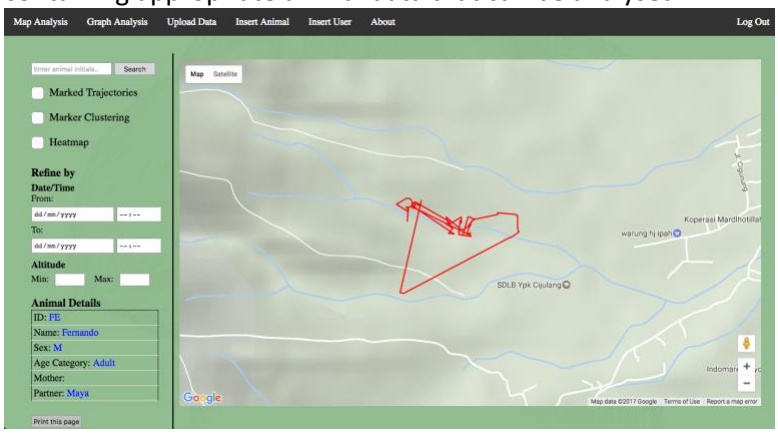
Process

1. Enter animal initials within the **Search Box**
2. Select map display option from **Line Trajectories**, **Marked Trajectories**, **Marker Cluster** or **Heatmap**.
3. Click **Search** button

Result

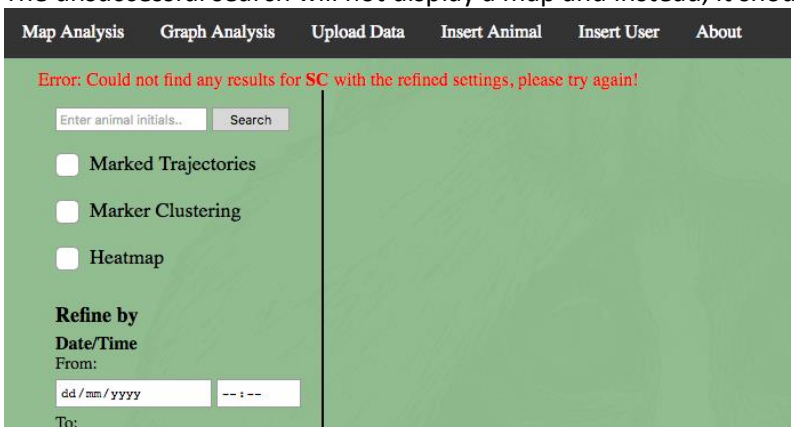
Successful

A successful search will generate a map on the right-hand side of the **Map Analysis** web page, containing appropriate animal data that can be analysed.



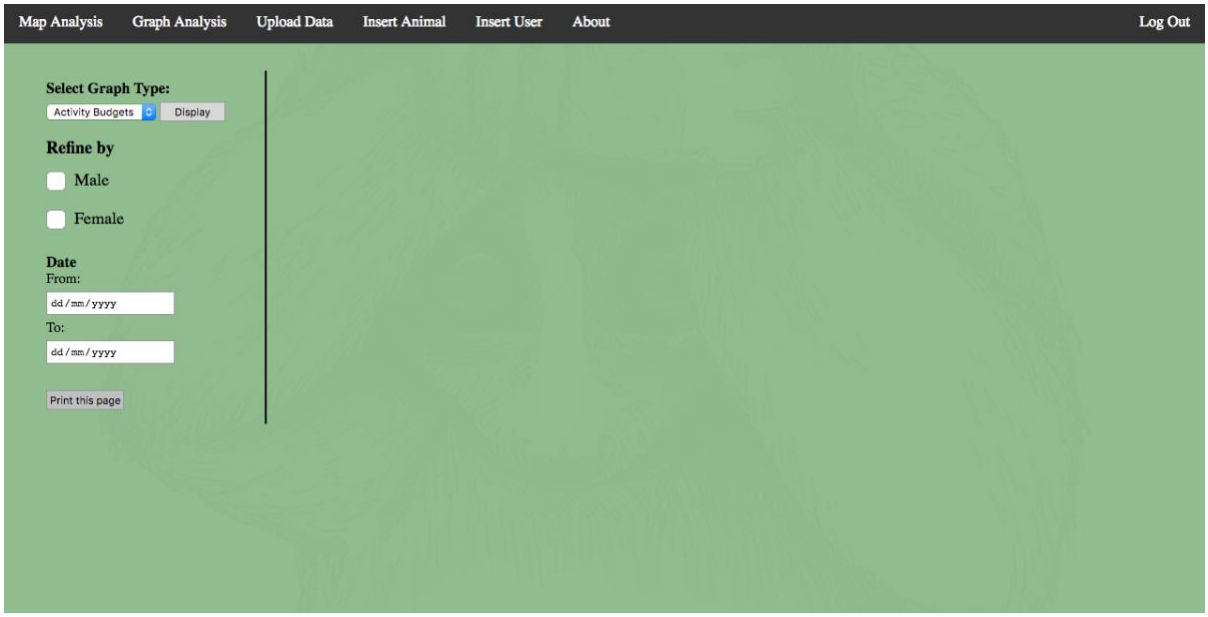
Unsuccessful

The unsuccessful search will not display a map and instead, it should display an error message.

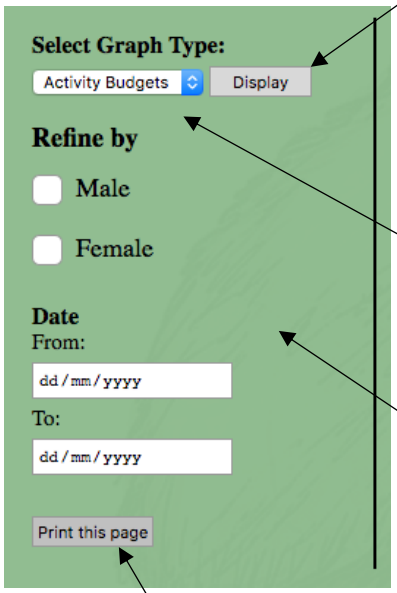


Graph Analysis

The **Graph Analysis** page is where different graphs can be generated with the help of data uploaded by the admin users. The graphs can assist the user to carry out a comprehensive analysis of the animal activities.



Graph Side Panel

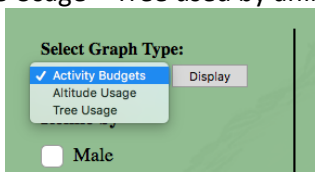


Display button – Select the graph type and Click **Display** button to generate the graph on the page.

Graph Type: User has an option of visualising from three different type of graphs.

- Activity Budgets - General activity of the animals
- Altitude Usage - Altitude travelled by each animal

Tree Usage – Tree used by animals



Refine by: The graph data results can be refined by animal gender and date. The user has the flexibility of selecting animal gender and date filter simultaneously.

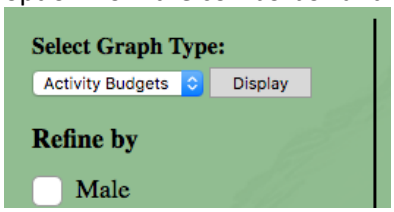
- Male – Refine search results of male animals only
- Female - Refine search results of female animal only
- Date - Refine search results 'From' or/and 'To' particular date

Print: Enable the user to print the page with graphs

Graph Display

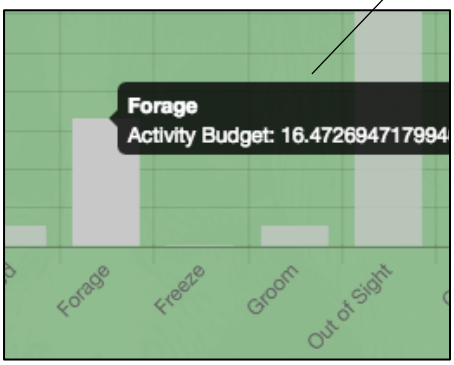
Activity Budget

In order to display activity budget graph, the user is required to select the default 'Activity Budget' option from the combo-box and click the **Display** button.



This will display the activity budget graph chart, where the animal behaviour type can be analysed. The graph has been generated utilising the data which has uploaded and animals that have been inserted by the admin.

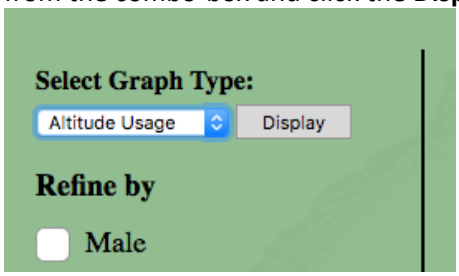
Graph type label title



Percentage of behaviour type can be viewed by hovering the mouse over the bar. For example: 16.47% of the animals spent time foraging.

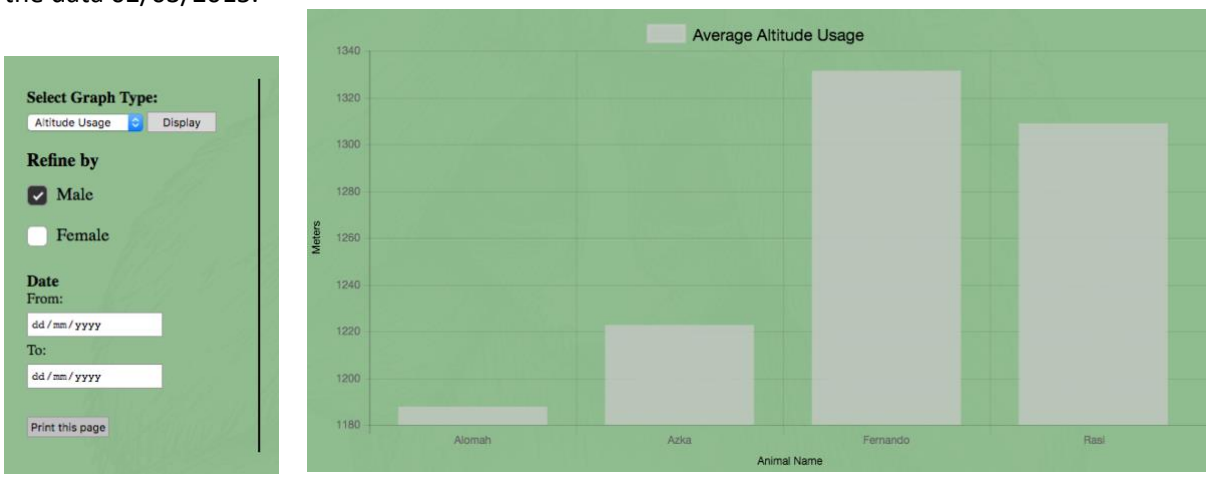
Altitude Usage

To visualise altitude usage graph, the user is simply required to select the ‘Altitude Usage’ option from the combo-box and click the **Display** button.



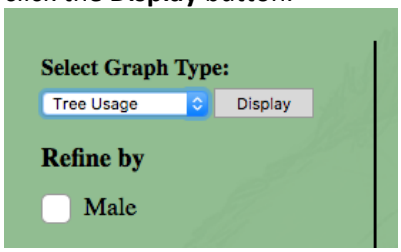
Which should generate a graph chart with the label Average Altitude Usage, where the average altitude usage can be analysed of each animal that has been inserted already through **Insert Animal**.

Further filtration can be applied to visualise the appropriate information. For example, Select ‘Altitude Usage’, then check ‘Male’, followed on by setting the ‘From’ date as ‘02/03/2015’, and click **Display** button. This will display a graph of only male animals, with their average altitude usage from the data 02/03/2015.

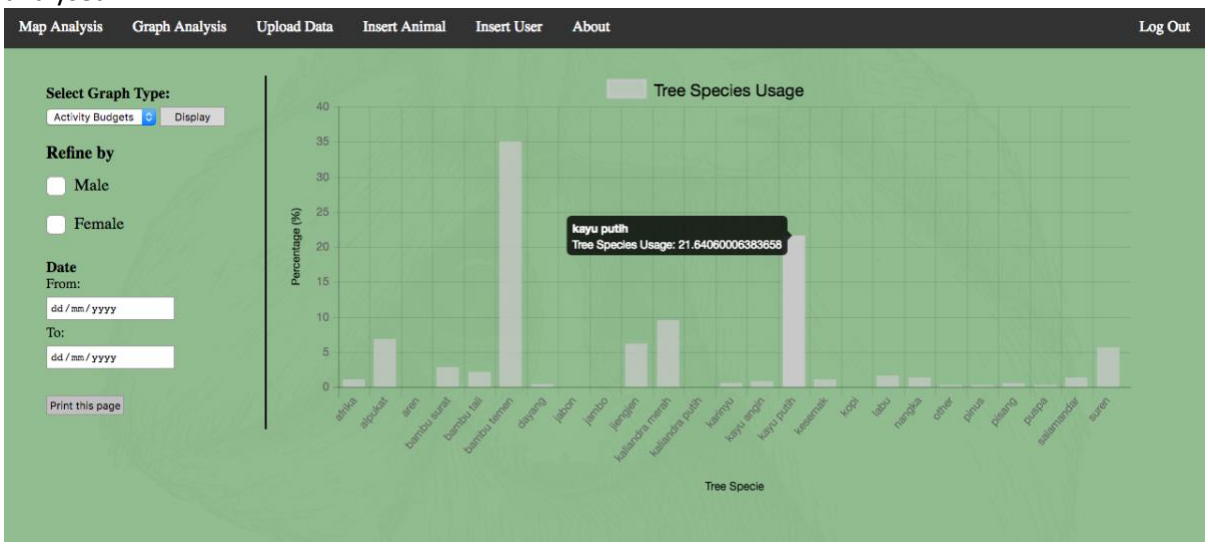


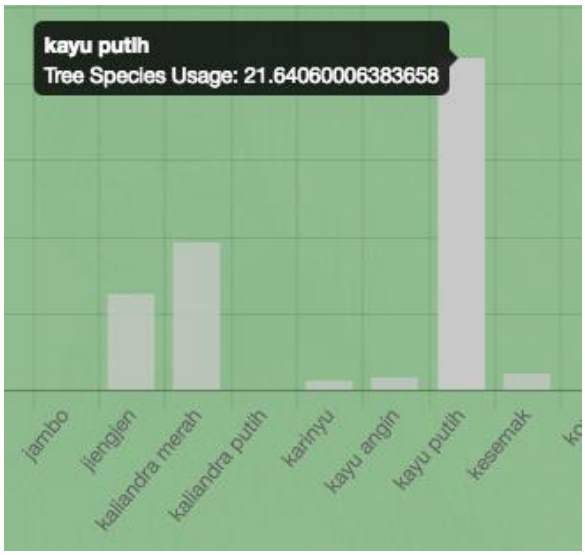
Tree Usage

To view tree usage graph, the user has to select the ‘Altitude Usage’ option from the combo-box and click the **Display** button.



This should generate a tree species usage graph chart, where the tree used by the animals can be analysed.





Percentage of Tree Species Usage can be accessed by hovering the mouse on the bar. For example: 21.64% of the animals spent time on Kayu Putih tree.

Prerequisite

In order to view the data, appropriate behaviour file which is required to be analysed should be uploaded beforehand. The user must select a graph type from the combo-box, in order to view the appropriate data, which exists within the database system. (Behaviour and animal data can be inserted by admin user via Upload and Insert Animal page respectably).

Process

1. Select Graph type from **Activity Budgets**, **Altitude Usage** or **Tree Usage**
2. Click **Display** button

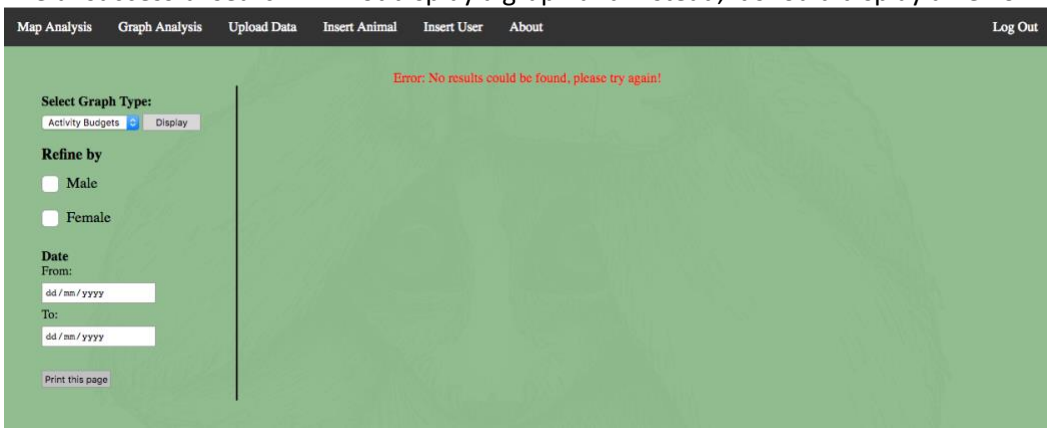
Result

Successful

A successful search will generate a graph on the right-hand side of the **Graph Analysis** web page, containing appropriate animal data that can be analysed.

Unsuccessful

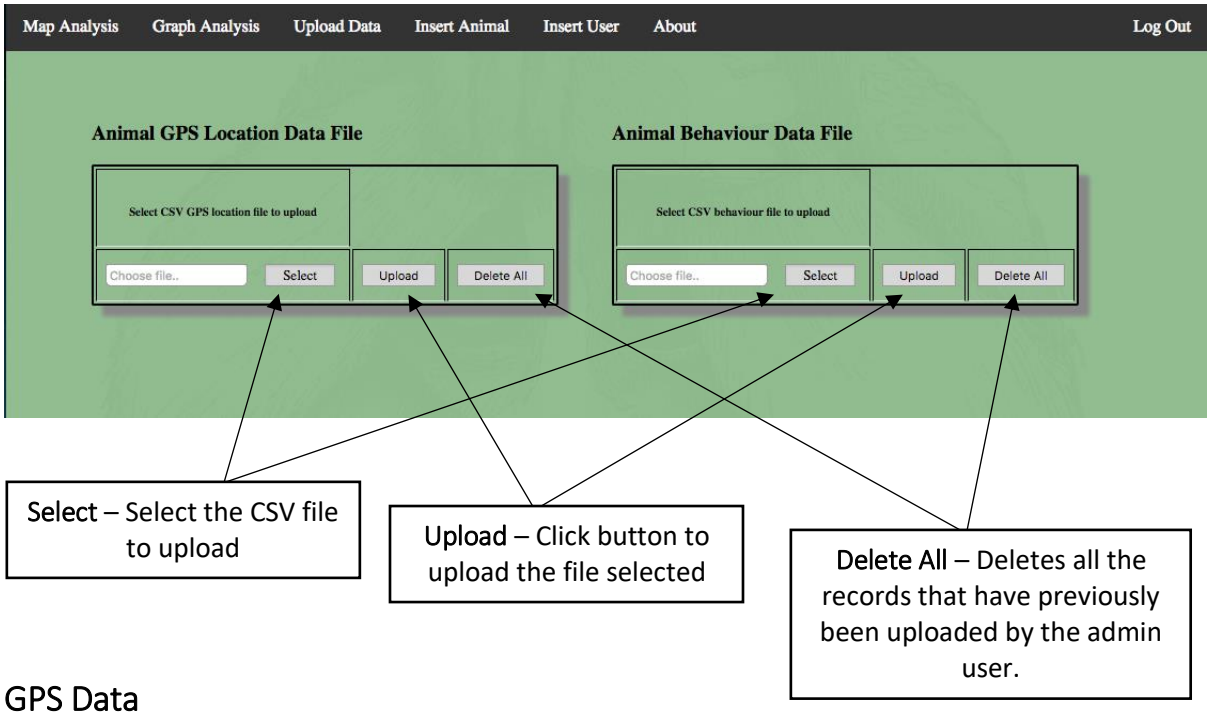
The unsuccessful search will not display a graph and instead, it should display an error message.



*In order to utilise the features below, please login with an account that has **Administrative Rights** enabled.*

Upload Data

The **Upload Data** page enables an administrative user to upload a CSV file containing the animal's behaviour and GPS location data.

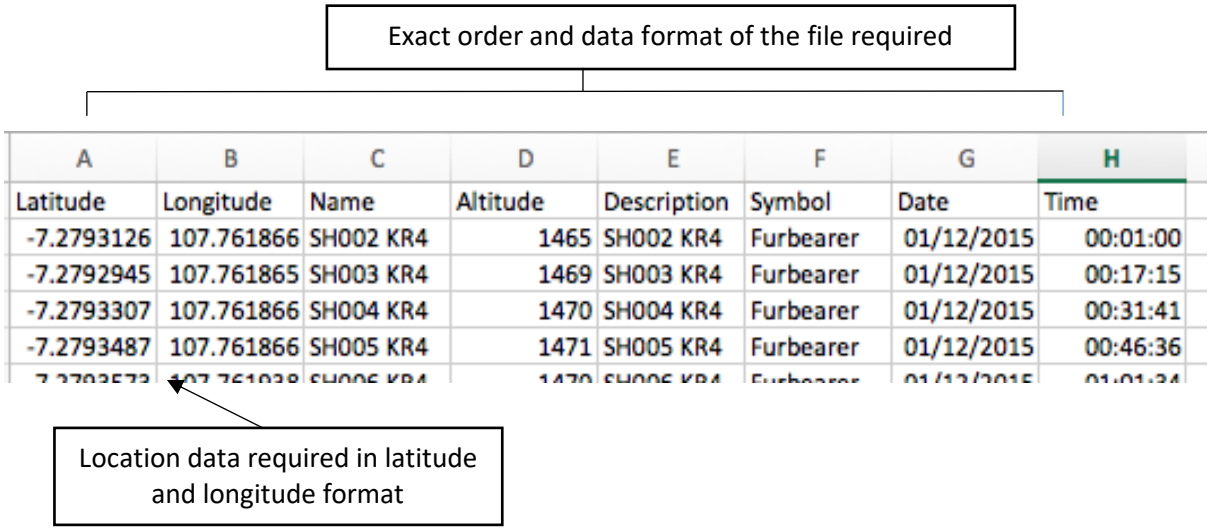


GPS Data

Prerequisite

In order to upload the GPS data to the server, the user is required to have administrative rights, and a CSV file containing appropriate data. The CSV file is required to be in the exact format and order as displayed in Format section below.

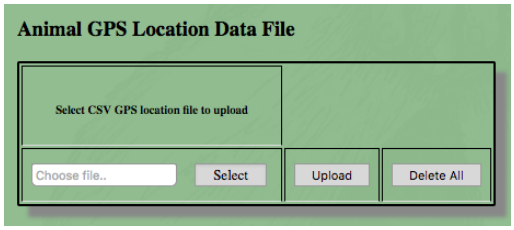
GPS CSV Format



Column	Heading	Mandatory	Format Rules	Example
1	Latitude	**True**	Range -90.00000000 to 90.00000000	-5.27931258
2	Longitude	**True**	Range -180.00000000 to 180.00000000	104.1318654
3	Name	**True**	SH002 KR4 - where SH must be the animal initials	SH002 KR4
4	Altitude	False	Numerical values with four decimal places Can be left empty but **recommended** to be inserted in order to visualise accurate **Altitude** data	1450.0000 1450
5	*Description*	*False*	*Can be left empty*	
6	Symbol	False	Text - Description of the animal symbol Can be left empty	Furbearer
7	Date	**True**	DD/MM/YYYY, where D is the day, M is the month and Y is the year	20/02/2017
8	Time	**True**	24-hour format - HH/MM/SS, where H is the hours, M is the minutes and S is the seconds	23:10:56 00:00:00

Process

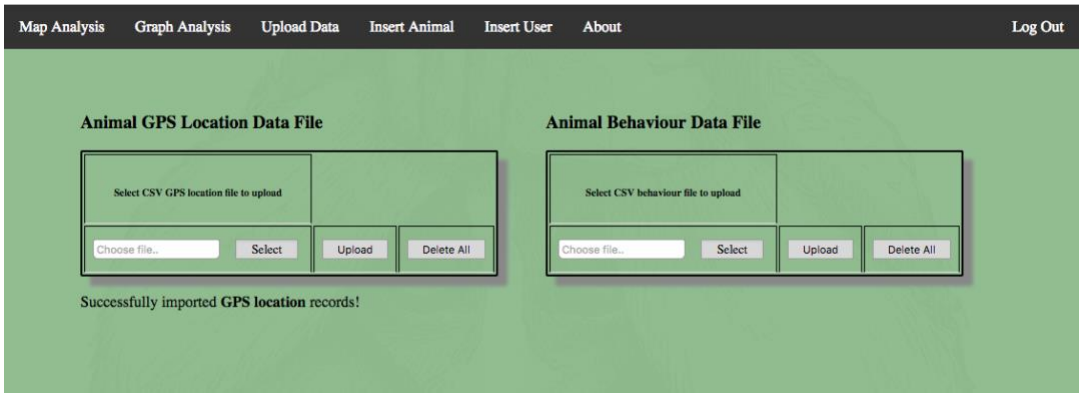
1. Click the **Select** Button
2. Select the **GPS Location** CSV file
3. Click **Upload** Button



Result

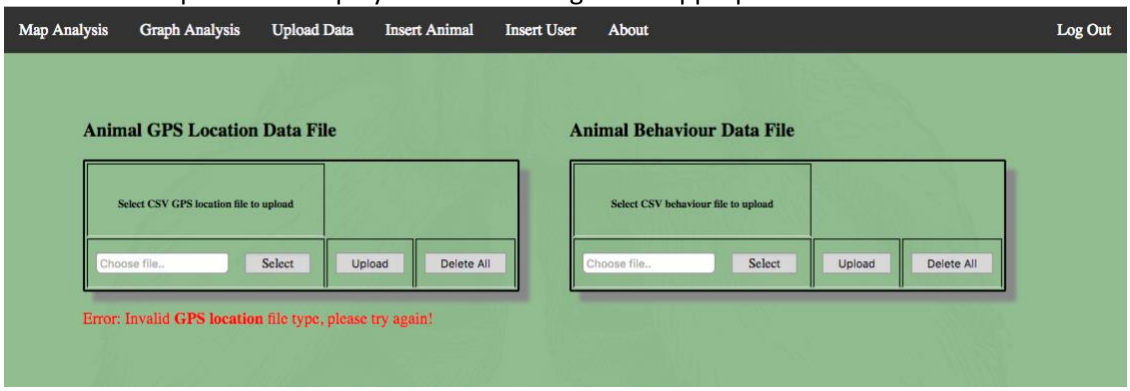
Successful

Successful upload to the server will display a message on the web page as “Successfully imported **GPS location** records!”.



Unsuccessful

Unsuccessful upload will display an error message with appropriate information.



Behaviour Data

Prerequisite

In order to upload the behaviour data to the server, the user is required to have administrative rights, and a CSV file containing appropriate data. The CSV file is required to be in the exact format and order as displayed in Format section below.

Behaviour CSV Format

Exact order and data format of the file required

	A	B	C	D	E	F	G	H	I	J
1	Observation	Date	Date2	Year	Total Hours of Observation	Start.time	End.time	Time of data	Observer	Tracker.Guide
2	20449	01-dŽc-15	01/12/2015	2015	05:10	17:50	23:00	17:50	dan	adin
3	20450	01-dŽc-15	01/12/2015	2015	NA	17:50	23:00	17:55	dan	adin

K	L	M	N	O	P	Q	R	S	T
ssistant.Other	Loris Id	Individual Name	Age	Sex	Mother of ID	GPS Label	Altitude (M)	Behaviour	Activity
NA	al	alomah	adult	m	one_eye	NA	NA	os	NA
NA	al	alomah	adult	m	one_eye	NA	NA	es	ac

U	V	W	X	Y	Z	AA	AB
Posture.Locomotion	Feeding.Amount	Feeding.Branch	Feeding.Item	Feeding.Technique	Position.in.tree	Animal.height (m)	Tree.height (m)
NA	NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	12	13

AC	AD	AE	AF	AG	AH	AI	AJ
Tree.species	Substrate.size	Substrate.type	No.substrates.used	Connectivity	Social.Behaviour	Partner.1 (Loris ID)	Partner.2 (Loris ID)
NA	NA	NA	NA	NA	NA	NA	NA
bambu_temen	NA	tk	NA	NA	NA	NA	NA

AK	AL	AM	AN	AO	AP	AQ	AR	AS
Distance.to.Observer (m)	Distance.to.partner (m)	Distance.to.partner.2 (m)	Vocalisation	Terrestrial.Distance (m)	Terrestrial.Duration	Rain	Rain.24.h	Fog
NA	NA	3	NA	NA	NA	0	0	NA
NA	NA	NA	NA	NA	NA	0	3	0

AT	AU	AV	AW	
Cloud	Moon.Phase	Moon.Visible.	Wind	Comments
0	NA	NA	10	NA
10	NA	NA	0	NA

Column	Heading	Mandatory	Format Rules	Example
1	Observation	**True**	Numerical value containing observation ID	20400
2	*Date*	*False*	*Can be left empty*	
3	Date2	**True**	DD/MM/YYYY, where D is the day, M is the month and Y is the year	20/02/2017
4	*Year*	*False*	*Can be left empty*	
5	*Total Hours of Observation*	*False*	*Can be left empty*	
6	*Start Time*	*False*	*Can be left empty*	
7	*End Time*	*False*	*Can be left empty*	

<table>
<tr><td>8</td><td>Time of Data</td><td>True</td><td>24-hour format - HH/MM/SS, where H is the hours, M is the minutes and S is the seconds</td><td>23:10:56
00:00:00</td></tr>
<tr><td>9</td><td>Observer</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>10</td><td>Tracker Guide</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>11</td><td>Assistant Other</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>12</td><td>Loris ID</td><td>True</td><td>ID is also known as animal initials which have a string length of 2
Animal must already exist within the system
Animal can be added via Insert Animal
ID should match the initials provided in the GPS</td><td>SH

LU

AZ</td></tr>
<tr><td>14</td><td>Individual Name</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>14</td><td>Age</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>15</td><td>Sex</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>16</td><td>Mother of ID</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>17</td><td>GPS Label</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>18</td><td>Altitude</td><td></td><td>Meters</td><td></td></tr>
<tr><td>19</td><td>Behaviour</td><td>True</td><td>Must match the following string value of behaviour ID, which has string length of 2

<table><tr><th>Behaviour ID</th><th>Behaviour Details</th></tr><tr><td>al</td><td>Alert</td></tr><tr><td>fe</td><td>Feed</td></tr><tr><td>fo</td><td>Forage</td></tr><tr><td>fr</td><td>Freeze</td></tr><tr><td>gr</td><td>Groom</td></tr><tr><td>re</td><td>Rest</td></tr><tr><td>sl</td><td>Sleep</td></tr><tr><td>so</td><td>Social</td></tr><tr><td>tr</td><td>Travel</td></tr><tr><td>ot</td><td>Other</td></tr><tr><td>os</td><td>Out of Sight</td></tr><tr><td>es</td><td>Eyeshine</td></tr></table></td><td>al

fo

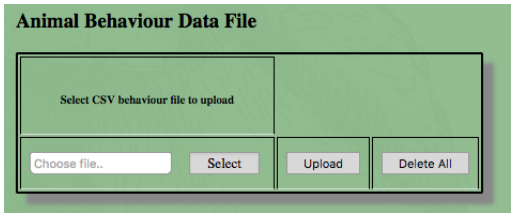
tr

es</td></tr>
<tr><td>20</td><td>Activity</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>21</td><td>Posture Locomotion</td><td>False</td><td>String length of 2
Can be left empty</td><td>si</td></tr>
<tr><td>22</td><td>Feeding Amount</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>23</td><td>Feeding Branch</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>24</td><td>Feeding Item</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>25</td><td>Feeding Technique</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>26</td><td>Position In Tree</td><td>False</td><td>Can be left empty</td><td></td></tr>
<tr><td>27</td><td>Animal Height</td><td>False</td><td>Range 0:100 meters
Can be left empty</td><td>40</td></tr>
</table>

28	Tree Height	**False**	Range 0:100 meters Can be left empty	13
29	Tree Species	**False**	Text value separated by underscore *Can be left empty* but **recommended** to be inserted in order to visualise accurate **Tree Usage** data	bambu_temen
30	*Substrate Size*	*False*	*Can be left empty*	
31	*Substrate Type*	*False*	*Can be left empty*	
32	*No Substrates Used*	*False*	*Can be left empty*	
33	*Connectivity*	*False*	*Can be left empty*	
34	Social Behaviour	**False**	String length of 2 Can be left empty	fw
35	*Partner 1 ID*	*False*	*Can be left empty*	
36	*Partner 2 ID*	*False*	*Can be left empty*	
37	*Distance to Observer*	*False*	*Can be left empty - Meters*	
38	*Distance to Partner 1*	*False*	*Can be left empty - Meters*	
39	*Distance to Partner 2*	*False*	*Can be left empty - Meters*	
40	*Vocalisation*	*False*	*Can be left empty - Meters*	
41	*Terrestrial Distance*	*False*	*Can be left empty - Meters*	
42	*Terrestrial Duration*	*False*	*Can be left empty*	
43	*Rain*	*False*	*Can be left empty*	
44	*Rain 24h*	*False*	*Can be left empty*	
45	*Fog*	*False*	*Can be left empty*	
46	*Cloud*	*False*	*Can be left empty*	
47	*Moon Phase*	*False*	*Can be left empty*	
48	*Moon Visible*	*False*	*Can be left empty*	
49	*Wind*	*False*	*Can be left empty*	
50	*Comment*	*False*	*Can be left empty*	

Process

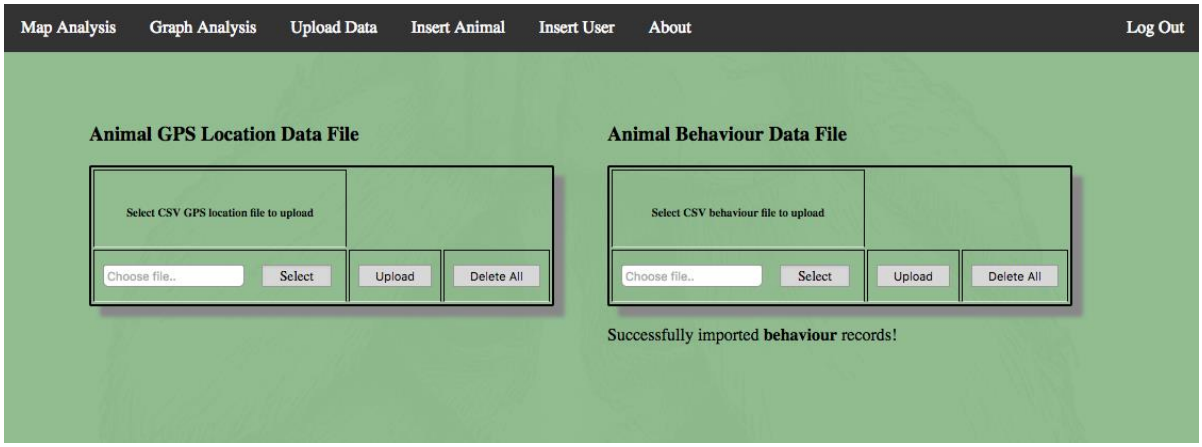
1. Click the **Select** Button
2. Select the **Behaviour** CSV file
3. Click **Upload** Button



Result

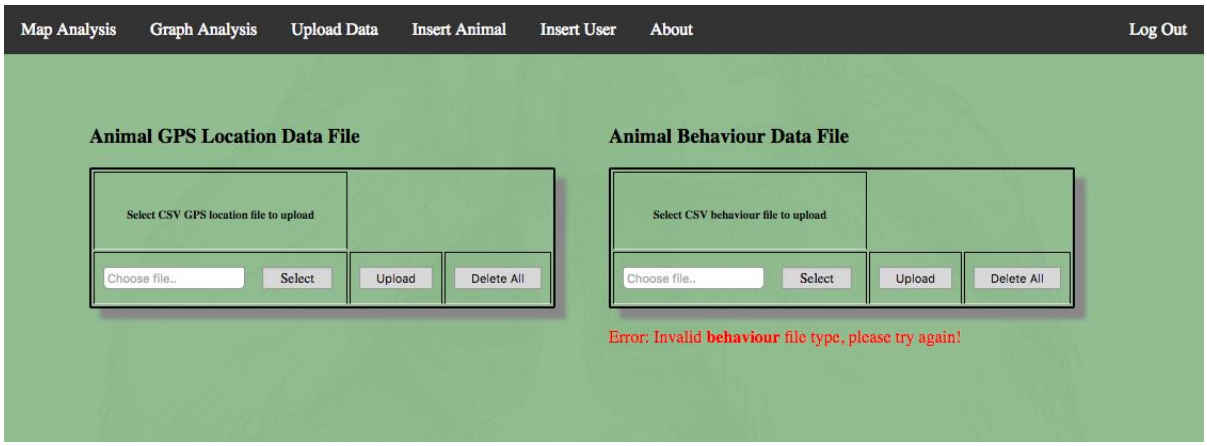
Successful

Successful upload to the server will display a message on the web page as “Successfully imported **Behaviour** records!”.



Unsuccessful

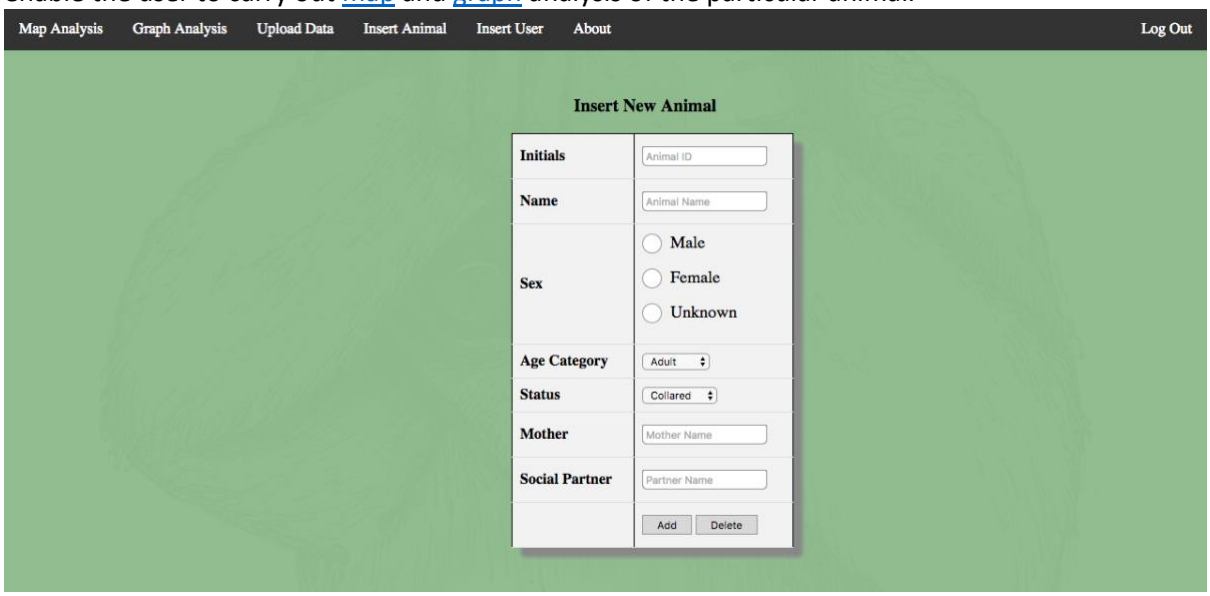
Unsuccessful upload will display an error message with appropriate information.



Insert Animal

Prerequisite

In order to insert a new animal to the server, the user is required to have administrative rights and must enter valid animal data that can be inserted via forms. By inserting an animal to the server will enable the user to carry out map and graph analysis of the particular animal.



Data Format

Labels	Mandatory	Format Rules	Example
Initials	True	Text - Animal initials also known as Animal ID, which usually has a string length of 2. The ID is usually extracted from the animal's name.	da
Name	True	Text – Name that was given to the animal	dave
Sex	True	Sex of the animal	Male
Age Category	True	Age category of the animal	Adult
Mother	False	Text – Name of animal's mother	maya
Social Partner	False	Text – Name of animal's social partner	tereh

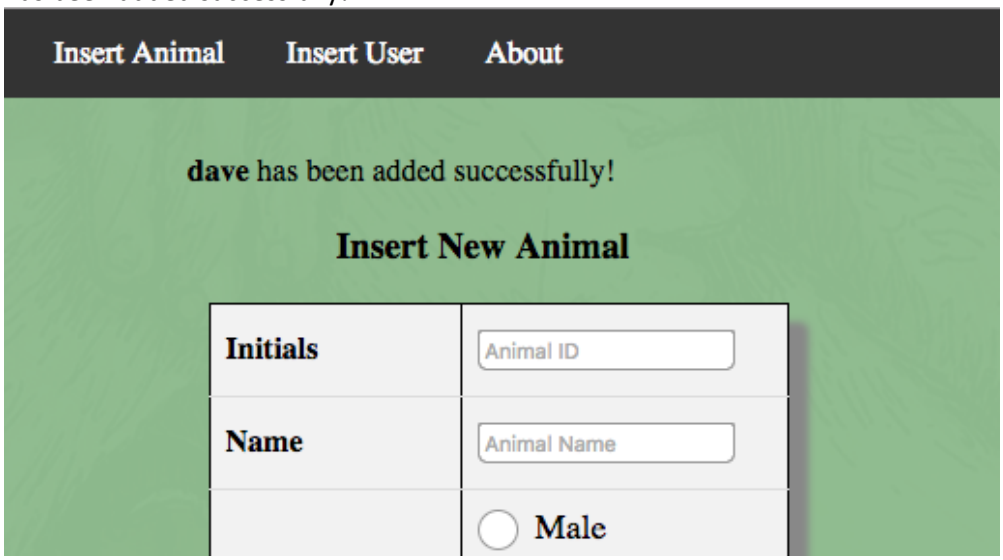
Process

1. Enter **Initials** and **Name** of the animal
2. Select animal sex
3. Select animal age category from the **Age Category** combo-box
4. Option – Enter **Mother** name and **Social Partner** name
5. Click **Add** button

Result

Successful

Successful insertion of the animal to the database will display a message on the web page as "**dave** has been added successfully!".



Unsuccessful

Unsuccessful upload will display an error message with appropriate information.

Delete Animal

Prerequisite

In order to delete an animal to the server, the user is required to have administrative rights and must insert valid animal **Initials** / Animal ID.

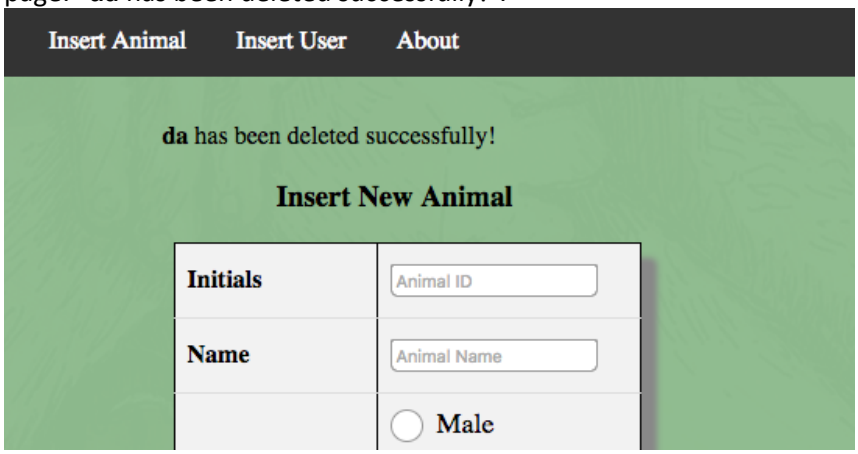
Process

1. Enter animal **Initials**
2. Click **Delete** button

Result

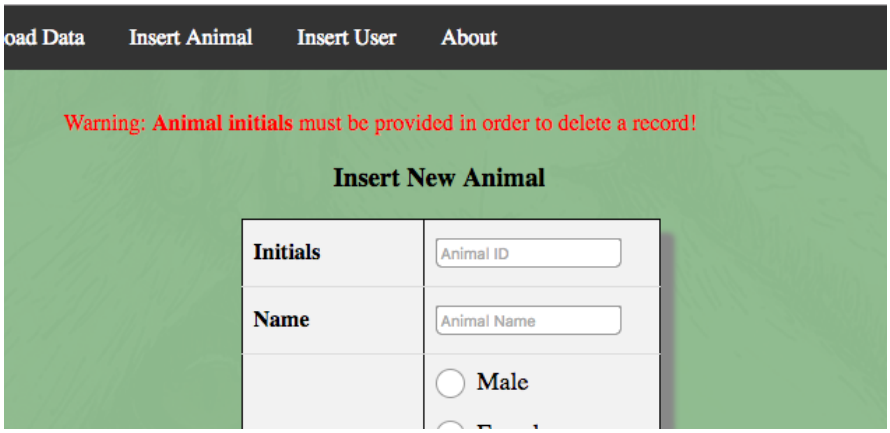
Successful

Successful deletion of the animal from the database will display the following message on the web page: "**da** has been deleted successfully!".



Unsuccessful

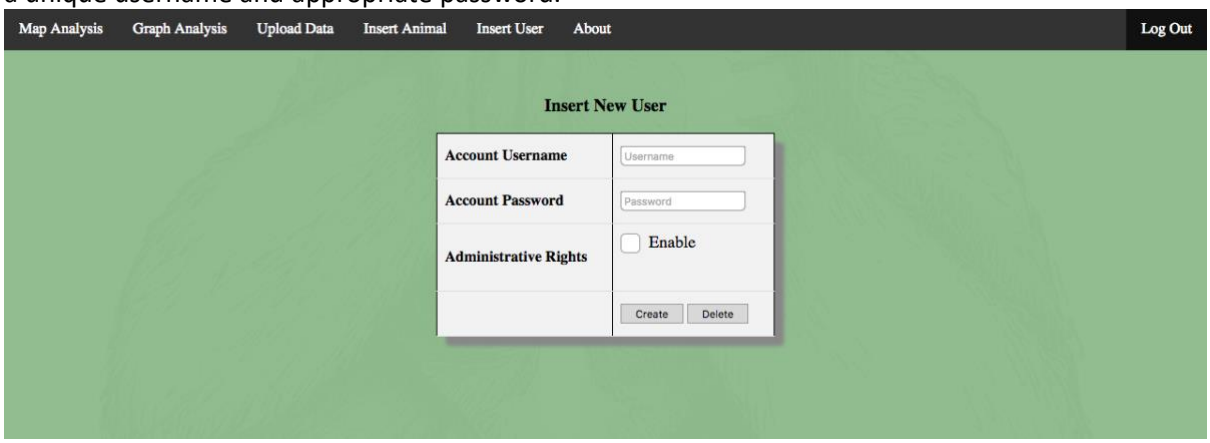
Unsuccessful upload will display an error message with appropriate information.



Insert User

Prerequisite

To insert a new user that can utilise the Tetra 2.0 system, the administrative user is required to enter a unique username and appropriate password.



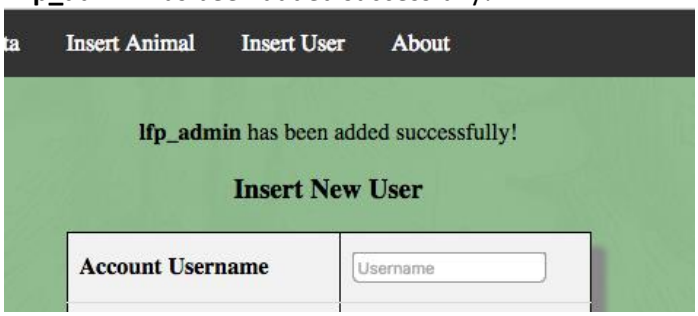
Process

1. Enter **Username** and **Password**
2. Check enable to provide user with **Administrative Right**
3. Click **Create** button

Result

Successful

Successful insertion of the animal to the database will display a message on the web page as "**lfp_admin** has been added successfully!".



Unsuccessful

Unsuccessful upload will display an error message with appropriate information.

Delete User

Prerequisite

In order to delete a user from the server, the administrative user must insert valid **Account Username.**

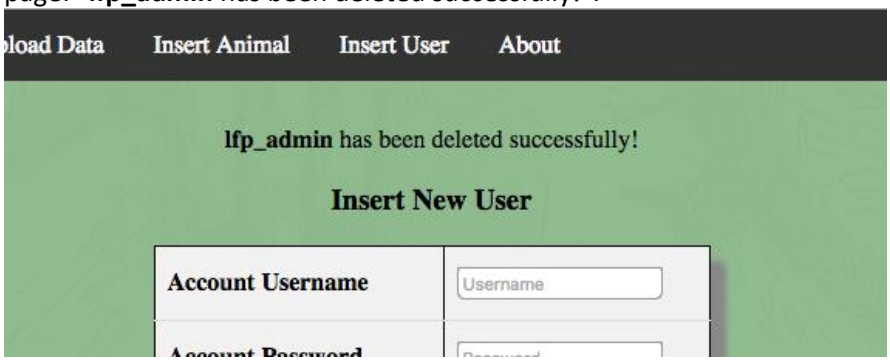
Process

1. Enter animal **Username**
2. Click **Delete** button

Result

Successful

Successful deletion of the user from the database will display the following message on the web page: "**lfp_admin** has been deleted successfully!".



Unsuccessful

Unsuccessful upload will display an error message with appropriate information.