User Notes to Accompany EarTraX and FLiteTraX GPS/GSM/UHF Terrestrial & Avian Tags

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1. Introduction

The GPS/GSM/UHF EarTraX Tags and FLiteTraX tags provided by GPS Collars Ltd contain many features that make them one of the most advanced wildlife telemetry GPS collars/tags available to purchase at this moment in time. At its simplest, the unit collects GPS data and then transmits that data via the cell-phone network to the servers of GPS Collars Ltd which is then available to view/download by the you either on a PC or smart phone.

2. Whats in the Box?

1. Lower clam shell housing with electronic board with battery below and solar cells above.
2. Upper clam shell housing.
3. Small bag of four sealing screws, two ear tag screws and small Allen Key.
4. Aussie Tag fittings for attaching tag to ear of animal. Smaller fitting allows for vertical orientation, while larger fitting allows for horizontal orientation.
5. Small screw driver supplied with EarTraX (Not FliteTraX). One screw driver per order up to 20 tags and 2 supplied for every order of more than 20 tags.

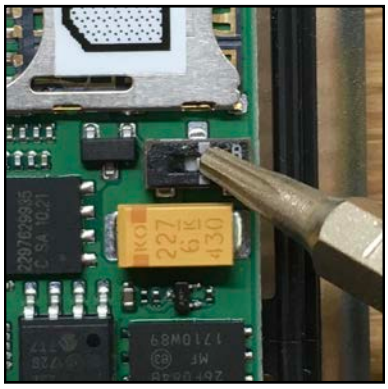
3. Turning on the unit and inserting the local SIM card.

Place the lower clam shell that holds the micro-electronics on the work bench.

To turn the unit on, first remove the solar panel. To do this, gently pull the solar cell up and it will come out of its connector.

The small toggle ON/OFF switch will be exposed, just below the SIM card holder.

To turn on the unit, slide the miniature toggle switch away from the edge of the unit. In this picture the toggle slides to the left.



Closeup of toggle switch.

To turn on the unit, slide it gently away from the edge of the board.

The Blue, Red, Amber and Green LEDs will start to flash. Each colour has a meaning and will be explained later.

The unit has now turned on.

EarTraX and FLiteTrax come with an embedded international roaming SIM already hard wired into the microelectronics. This is permanently fitted to the unit and allows GPSCollars to connect to the unit regardless of network provider. However, in order to gain faster access to local mobile networks in your study area, both EarTraX and FLiteTraX allow the user to insert their own SIM card.

Slip in Local SIM Card.

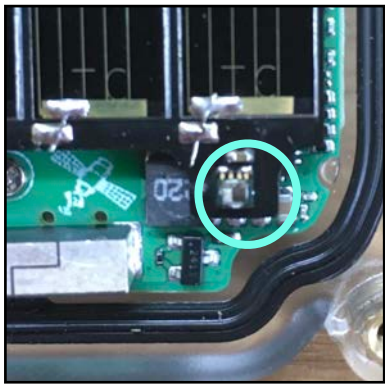
The SIM card local to the area of study will preferentially connect to the local network. If the chosen network is not available, the unit will revert back to the International roaming SIM embedded in the microelectronics and connect to any other network that might be available. If the unit cannot connect to a network, then data can be downloaded using the UHF radio link.

Local SIM Card fitted.

Reattach solar panel. Correct orientation is important.

Ensure that the Solar Lux meter is adjacent to the small satellite image. See enlarged image below.

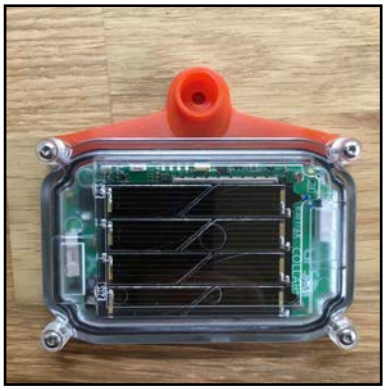
If the solar cell is incorrectly fitted, the solar cells will glow a warning red colour. Just remove the solar cells and refit the correct way.



Solar lux meter circled in blue to the right of the image of a satellite.

Using either the Allen Key or TorX screwdriver, tighten up the four corner stainless steel screws. Do not over-tighten.

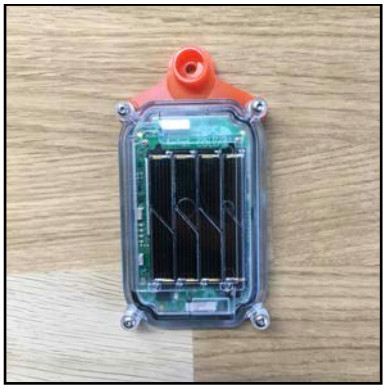
Hot wax can be used to cover the screws to prevent them undoing. DO NOT USE superglue as you will never be able to reopen the case again to recover the SIM card or turn the unit off.



The ear tag fitting is screwed onto the back of the EarTraX unit with the two small screws provided.

The larger knobbly bit of the ear tag fitting is always on the same side as the solar panel. This means that the solar panel is always facing away from the ear of the animal.

The longer ear tag fitting allows the EarTraX unit to sit in the horizontal plane



The shorter ear tag fitting allows the EarTraX unit to sit in the vertical plane.

The EarTraX tag is now ready for fitting to the animal.

This picture shows how the tag and pin are loaded into the applicator.

Once the unit has turned on, it should be put outside in a place that has a clear view to the sky to get GPS data, GSM connection and solar gain.

This is a clear view of the sky!

DO NOT PLACE IT BEHIND A WINDOW. WINDOWS OFTEN HAVE LEAD IN THE GLASS WHICH REDUCES GPS SIGNAL STRENGTH AND SOLAR GAIN BY UP TO 50%. DO NOT PLACE IN A WINDSCREEN (WINDSHIELD) FOR THE SAME REASON.

The unit ID is on the back of the unit below the battery. Log into your webpage with your user name and password and confirm that the unit has logged with our servers and is displaying the correct date and time at the correct location.

If you have purchased FLiteTraX or EarTraX, you will also receive a solar dome. This can be used to boost the solar battery in a single unit by providing a concentrated LED light at the correct wavelength. This can be useful if you want to rapidly charge a single unit during testing.

THE UNIT IS NOW GOOD TO GO!

4. Flashing LEDs.

There are four LEDs that flash on the units. Each colour has an explanation and reassures the customer that the unit has done something.

1. Blue LED: Heartbeat. Flashes every 3-4 seconds when unit is awake and every 15 Seconds in Sleep mode.

2. Green LED: GPS.
    1. Single Flash = GPS acquiring data.
    2. Double Flash = GPS Position Locked

3. Orange LED: GSM.
    1. Single Flash = GSM On
    2. Double Flash = Logged in to a Network,
    3. Triple Flash = Connected to the Server

4. Red LED – Tick – Low Battery (This tends to not happen, because the under voltage circuity on the solar charge IC just turns off power to the micro.)

LED Settings can be updated from the server. The default is '1':

- 0 = LED's always off
- 1 = LED's on for 15 minutes after removing the magnet, thereafter, no flashing.
- 2 = LED's always on

To be clear, on the default setting, the "light display" will only occur for 15 minutes after the unit is turned on. After 15 minutes, the LEDs will no longer flash, but the unit will still be working.

5. Battery Life.

5.1. Variables that affect battery life.

These include:

1. View to the sky. With a clear view to the satellites, then GPS can acquire a location very rapidly and use little power. However, where the unit is hidden by vegetation, then more power is required and battery life in the collar will be shorter or battery recharge time in FLiteTraX and EarTraX will take longer.

2. Proximity of cellphone towers. If a unit is close to a tower, then little power is used, but if the cellphone mast is many km distant then power usage is high.

3. 3G/GPRS/SMS. FLiteTraX and EarTraX are unique in that they can switch between Data using 3G/GPRS and text using SMS. All tags and collars preferentially use 3G/GPRS but when these are not available then the collars and tags switch over to SMS. Data is unlimited but the power used is heavy, while text is limited to a single location but power use is minimal. There is therefore a trade off between power use and data collected/transmitted. Talk to staff at GPS Collars to ensure that your specific requirements are met.

5.2. Expected Battery Life.

1. Solar EarTraX and FLiteTrax Tags: :30 minute GPS and daily transmit with indefinite life.

2. Without any solar input, FLiteTraX and EarTraX will provide GPS data every four hours for up to 10 days.

3. We are happy to provide variable settings for different collars for you to test various scenarios. Just let us know and we will do our best to set something up.

6. GPS and GSM Schedules.

6.1. GPS data collection: Archive, Buffer and Immediate.

GPS Location Data on each unit is handled in three different ways…

Buffer: GPS Data is collected and stored into buffer (in addition to storing to archive) ready to be sent upon next GSM 3G connection.

Archive: GPS Data is collected and stored into archive (locally) on board the unit and is extracted upon an explicit command from our servers. GPS data to be stored into archive can be collected more frequently than GPS data stored into buffer.

Immediate: GPS Location Data is collected (stored into archive and buffer) and is sent immediately by SMS text.

Note that the interval between successive GPS location points stored into archive and successive GPS location points stored into buffer can be different. GPS power drain is extremely small while GSM power drain is very high particularly where 3G signals are poor. Therefore, in poor GSM areas, we can set the archive GPS data to a high rate - 15 minutes for example, while the GPS data to buffer can be far lower - 4 hours for example. When the unit connects in poor service areas, then only a small packet of data is sent from the buffer which is more likely to be successful. When the unit comes into a better service area, we can then request to download all the data out of archive.

6.2. GSM data: Data and SMS.

FLiteTraX and EarTraX are the only collars/tags on the market that can switch between a data call using the 3G & GPRS networks or SMS using the traditional 2G network.

By using 3G and GPRS networks, high volumes of data stored in the buffer since the last connection can be sent to our servers. Additionally, all the data stored in the collar archive can be downloaded using an explicit command from our servers. All collars and tags preferentially transmit using a data call on the 3G or GPRS networks. Therefore, if the unit is logging data every hour (to archive and to buffer) and the transmit is every 3.5 days, then 84 GPS locations will be sent to our servers and displayed onto your web page. By saving the data to buffer which is then sent and also saving the data to archive is a double back up storage feature. Data is never erased from the unit.

If the unit is not able to connect to a 3G mast (too far away) and will connect to the mobile phone network via 2G, then the unit will transmit the last known location via SMS text. Therefore, if the

unit is logging every hour and the transmit is every 3.5 days, then 83 locations will be stored into archive on board the unit and the last (84th) will be sent by text using SMS. If this situation continues, only the 84th GPS location is ever sent and all the other data is archived (stored) on board the unit. However, if the unit then comes back into a good 3G network, then all data in buffer (84 locations) since the last transmission, 3.5 days earlier, will be sent. If the unit remains in a good 3G network, the archived data can be requested and a data dump of all data on board the unit will be downloaded to the server and then on to your web page.

If you require data to be sent back to our servers more frequently than once per day, then this can also be achieved depending on battery power. In such scenarios, location data can be sent via text as frequently as once every 15 minutes. This does however come at a cost - it is expensive and would be out-with the standard monthly fee.

The SIM card in each unit can switch between up to two network providers, while SMS will be transmitted over ANY network provider.

6.3. Default Settings upon receipt of the FLiteTraX and EarTraX

All FLiteTraX and EarTraX are shipped with a default of hourly GPS (archive and buffer) and daily GSM transmit if the unit is moving and 3.5 day GSM transmit if the unit is not moving. So if you test FLiteTraX or EarTraX on the default mode, then be sure to move the units once per day for at least ten seconds. If the unit is in within a 2G or poor 3G reception, only the last known GPS location will be sent which will be by text, all other collected GPS data will have been stored into archive for later download when the unit comes into better 3G reception.

6.4. GSM Transmission

FLiteTraX and EarTraX are the only collars/tags on the market that can switch between a data call using the 3G & GPRS networks or SMS using the traditional 2G network.

7. Mortality - personal alert.

All units come with a mortality sensor. This is activated when no movement is recorded by the on-board accelerometers. This time window can be set to anything between 5 minutes and 24 hours and can be set remotely.

If the mortality is activated, then in practice the GSM will still transmit and include the last known GPS co-ordinates. An SMS will also be sent to our servers and then an SMS is sent to your personal or work mobile alerting you to the fact that the unit is stationary and perhaps the animal is dead. If however, the unit keeps firing off false alerts, then we can change the activation settings to a higher time of inactivity before an alert is set.

Therefore to activate mortality, send to the staff at GPS Collars Ltd, the chosen “inactive” period and your mobile number to receive the text alerts. Please only activate the mortality on a collar once it has been fitted to an animal otherwise there can be a lot of false alerts as a tag is left on the shelf or in a car for extended periods of time.

8. UHF Tracking Beacon.

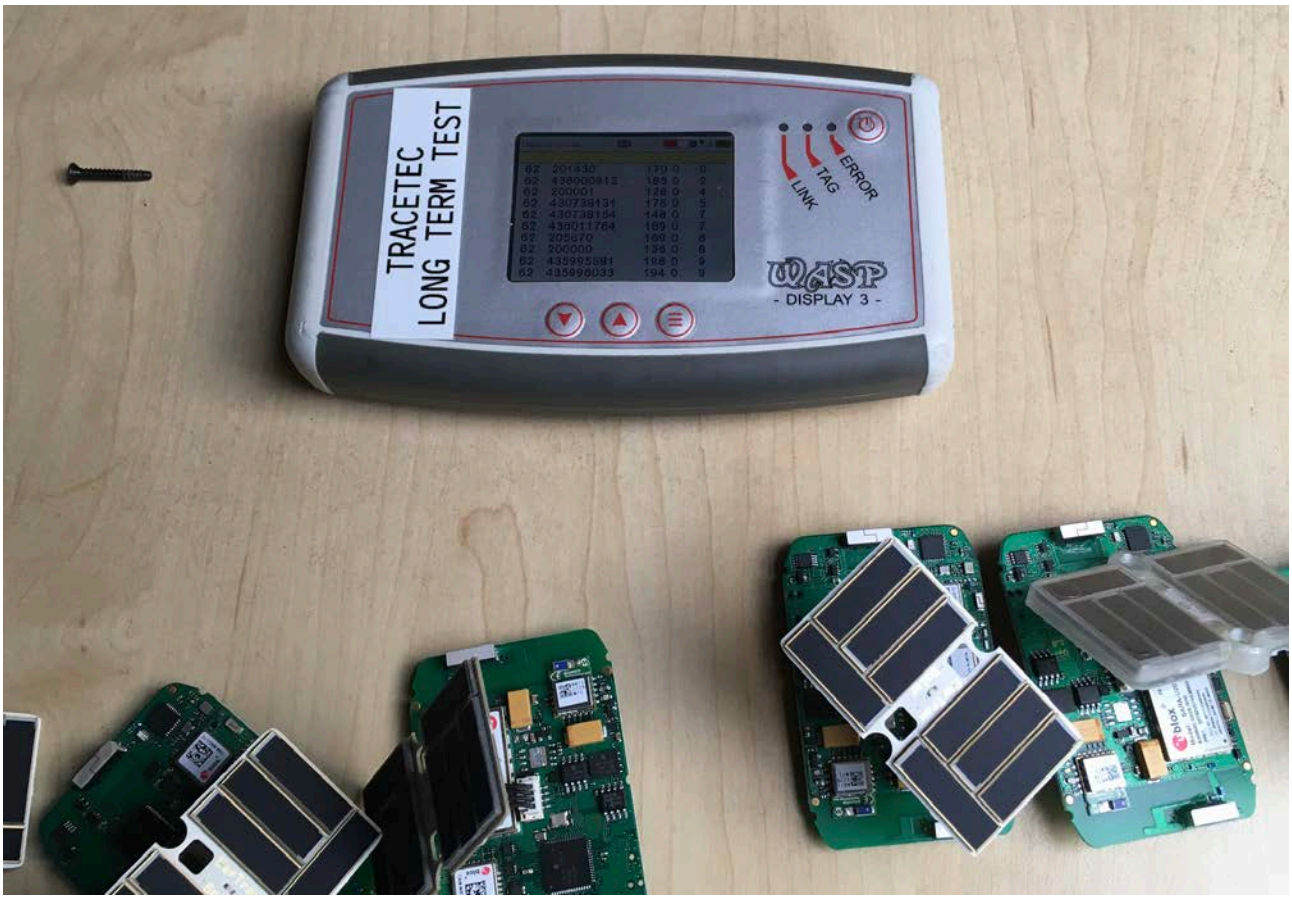
The tracking beacon on our collars and tags use UHF rather than VHF. This provides a significant number of advantages.

1. All tags use the same frequency, but are separated by their unique ID which is their eight character serial number such as 19FC c81f.
2. The carrier signal also carries the last known GPS location with specific GPS Co-ordinates.

Therefore, when you lock into a specific animal you get the last known GPS location which will take you to where the animal last was. The UHF transmit this information every 4.3 seconds.

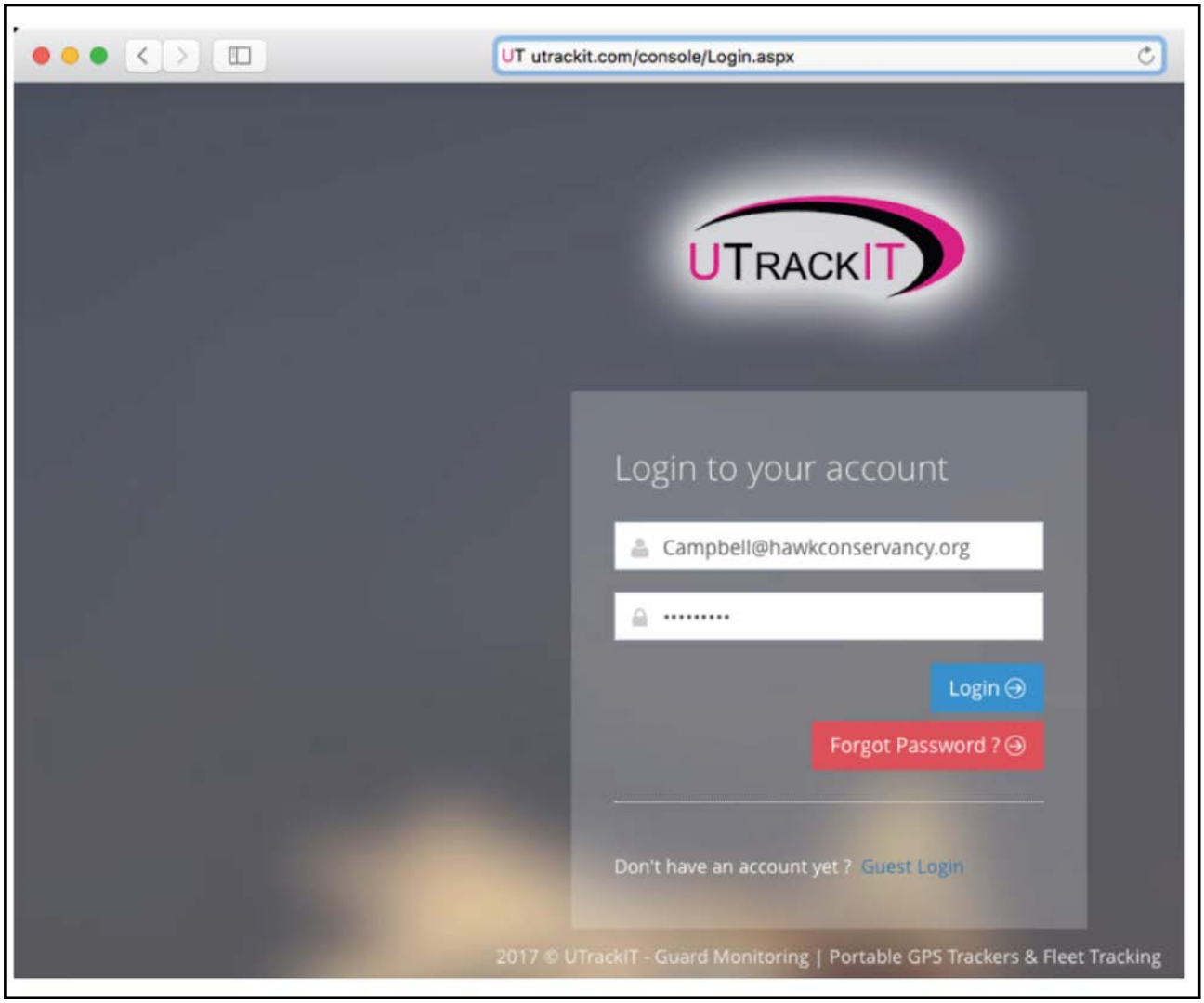
Our receiver works with both a patch antenna and a Yagi Antenna and can pick up and separate multiple units at the same time providing individual GPS locations for every unit received.

The Patch antenna can pick up a signal from the unit over a range of 5km in a 270 degree arc. 50% of the time the unit will also receive signals over a range of 15km. This means that the use of the patch antenna can be used over an extended range and does not need multiple points in order to triangulate the location of an individual.

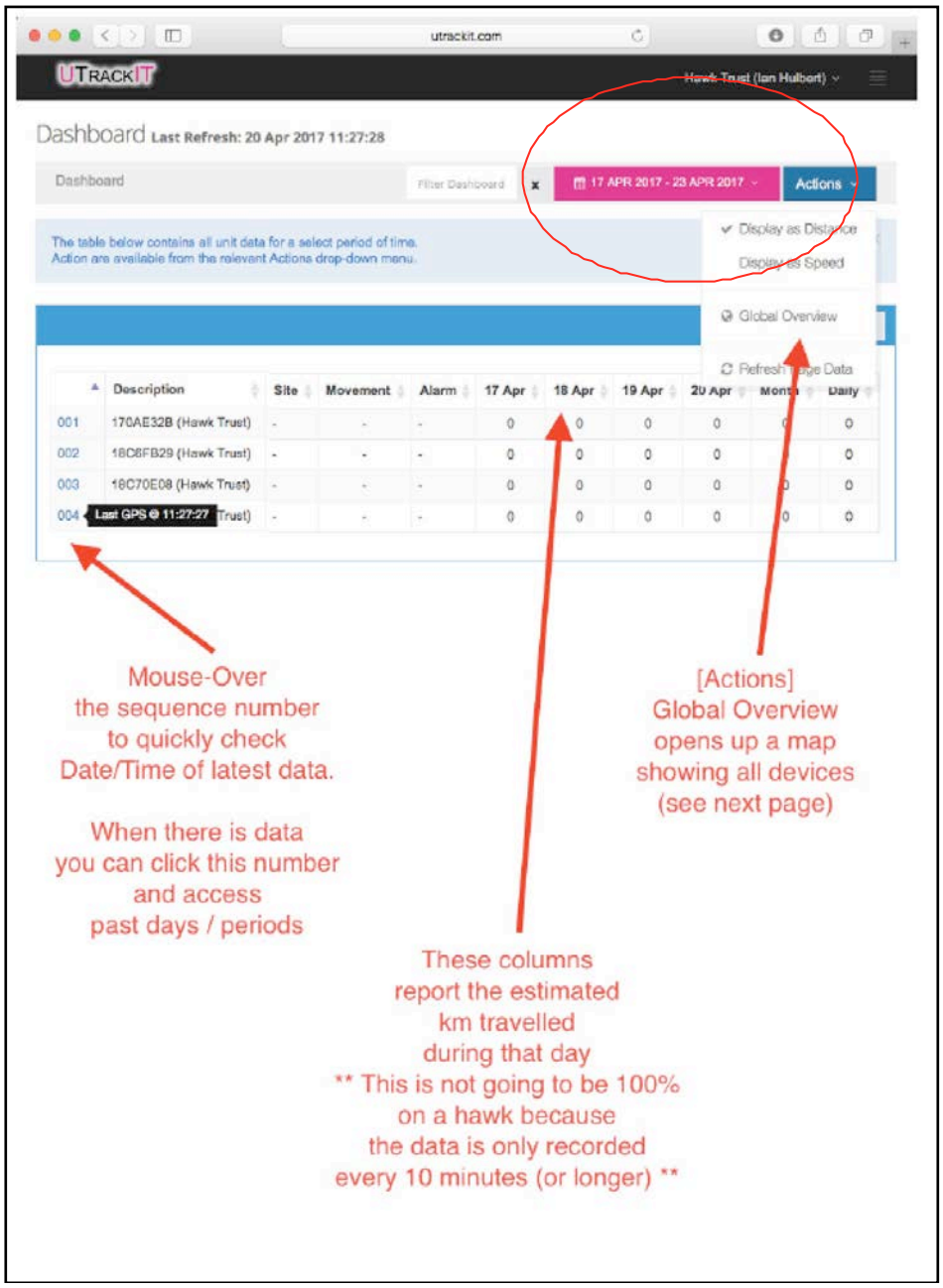


9. Accessing Data

Go to www.gpscollars.co.uk and login using your username and password.
Alternatively go to www.utrackit.com and login using your username and password.

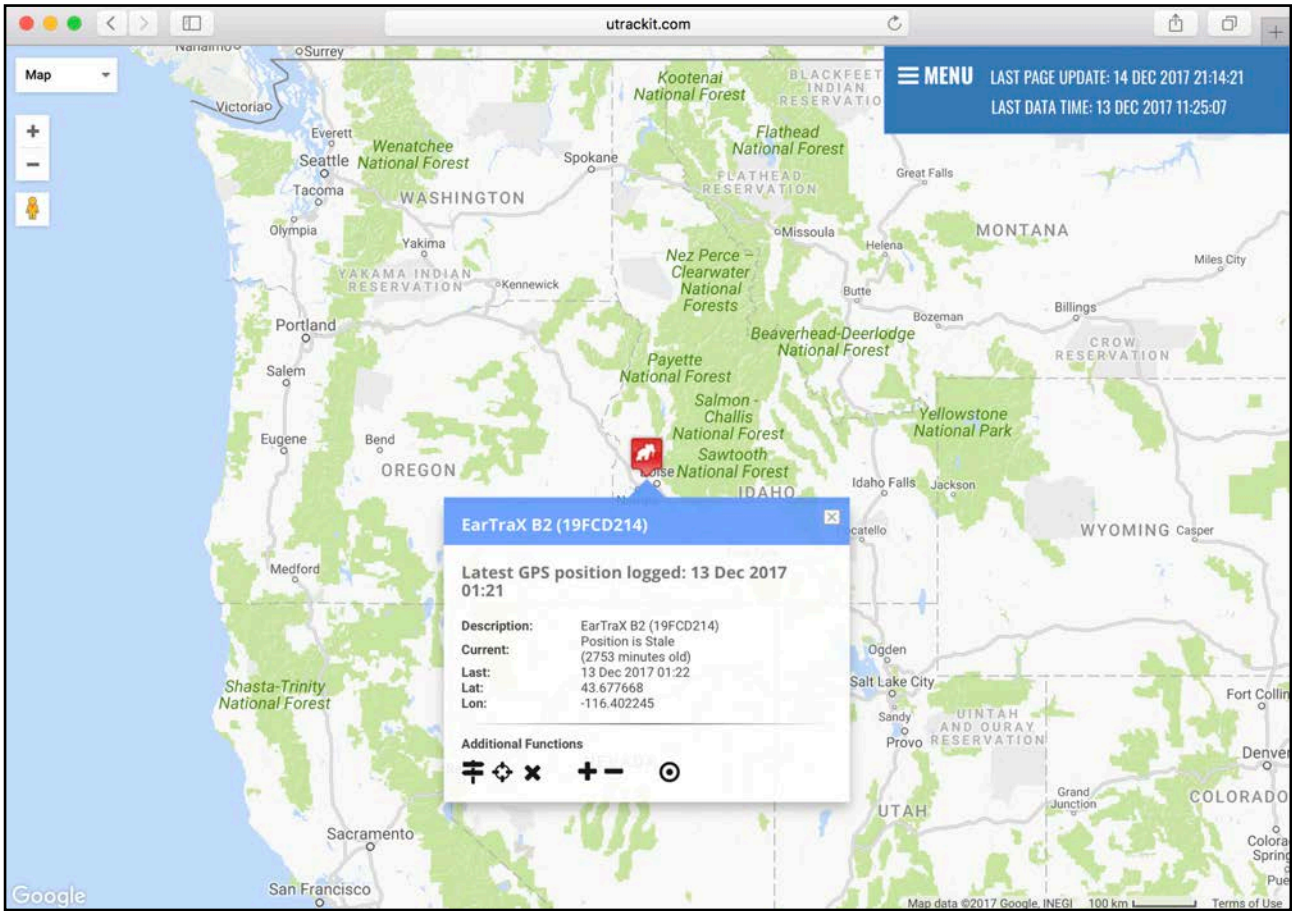


Once logged in you will be taken to the DashBoard. The reference to species below are for a bird fitted with a FLiteTraX tag Ensure the date range is correct.



Click on the Unit ID to proceed to the mapping page..

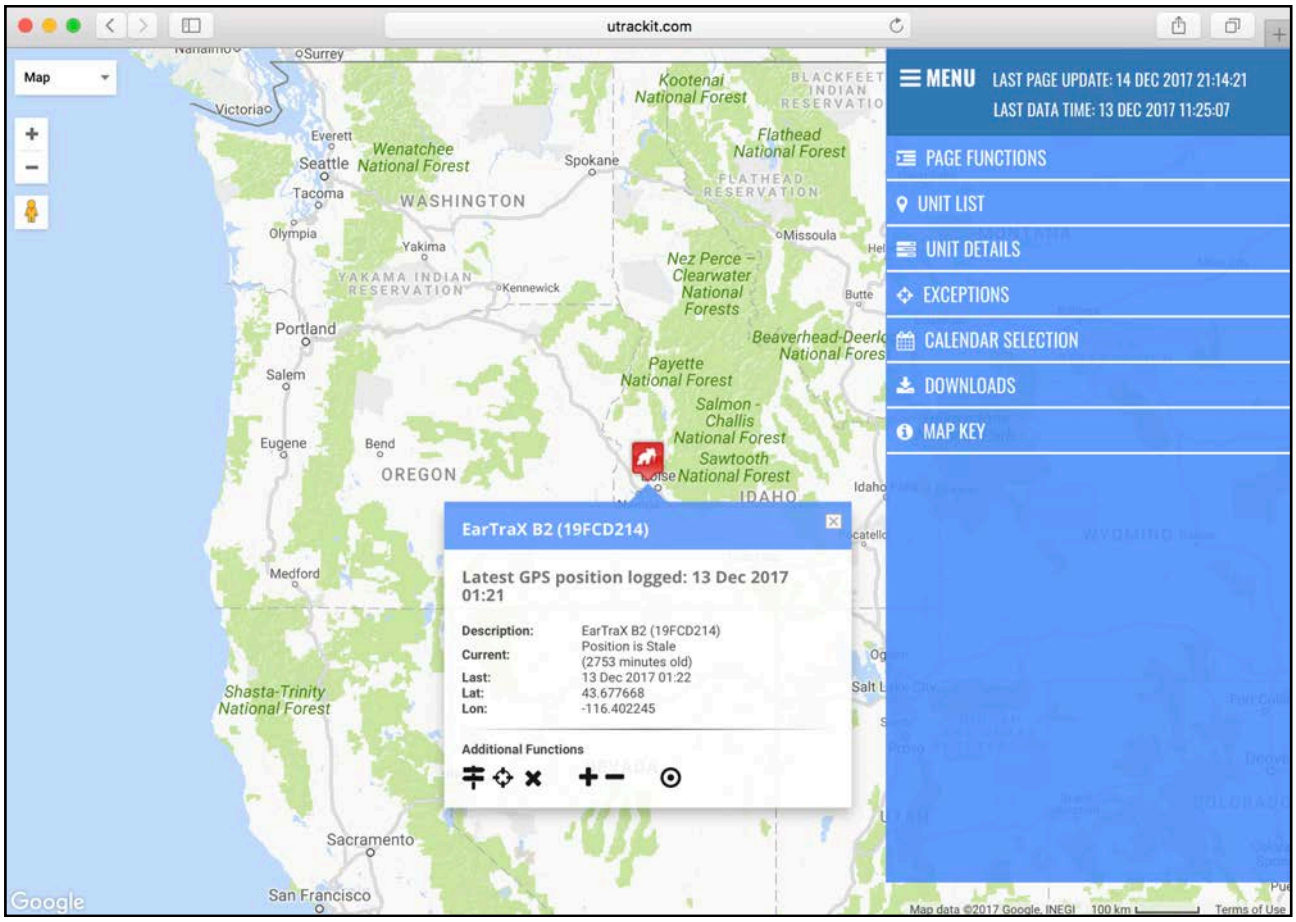
Mapping Page



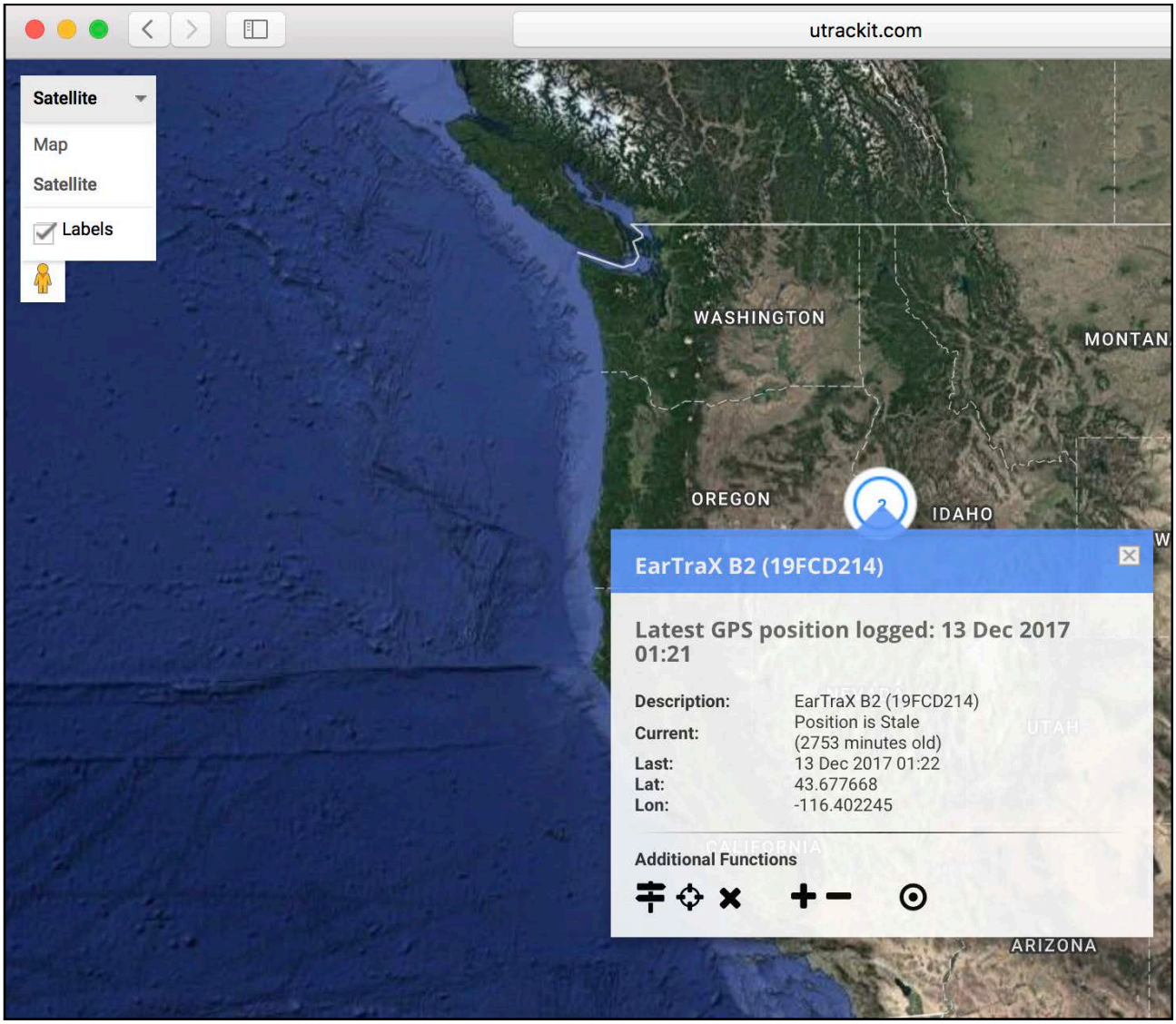
Within the dialogue box, the unit ID is displayed with the time of the last saved location and its latitude and longitude.

Move the mouse over to the small icons to show trail, fit to trail, clear trail, zoom in and out and to centre the map on this device.

Click on Menu to reveal further information

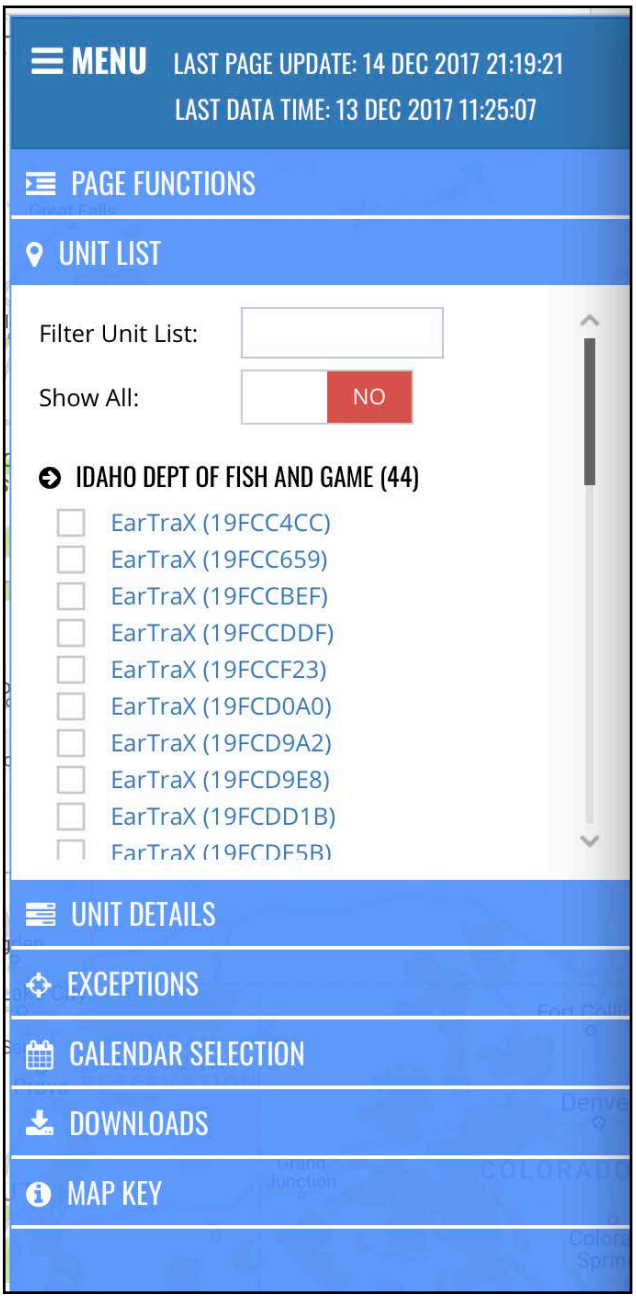


Switch between satellite and map mode..

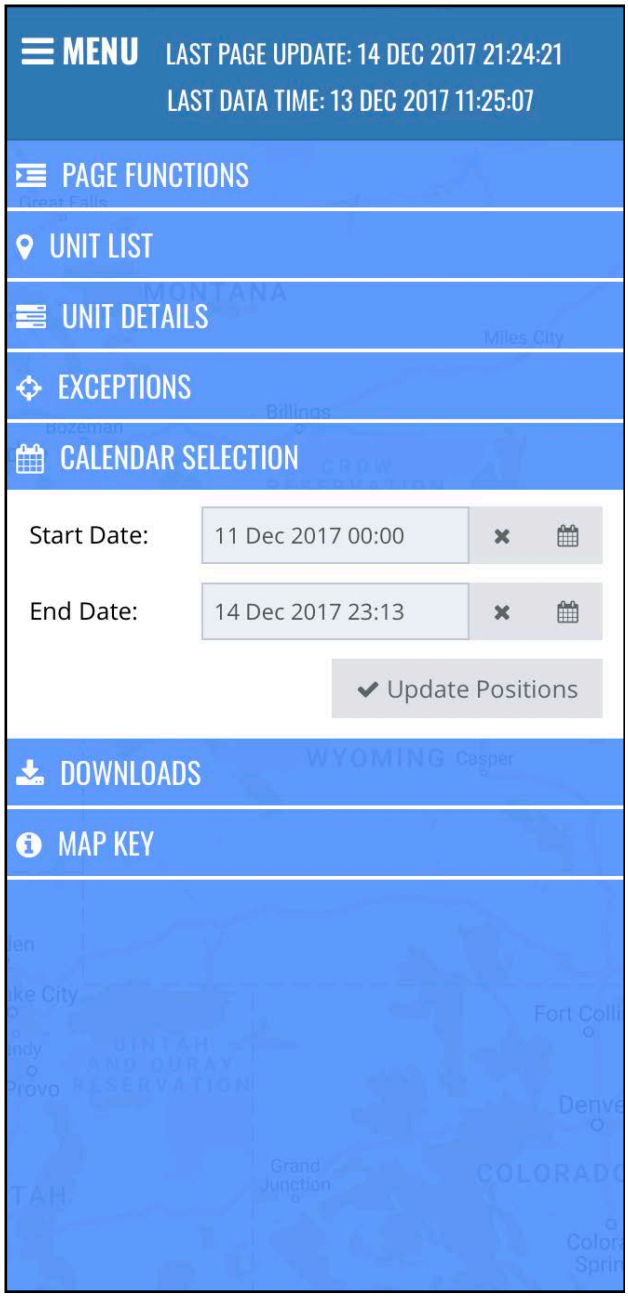


To move back to DashBoard use “Page Functions” rather than back button on your browser. Within the Menu, you can select between the Unit List, the Unit Details, Calendar Selection and Downloads. Exceptions and Map key still need to be refined.

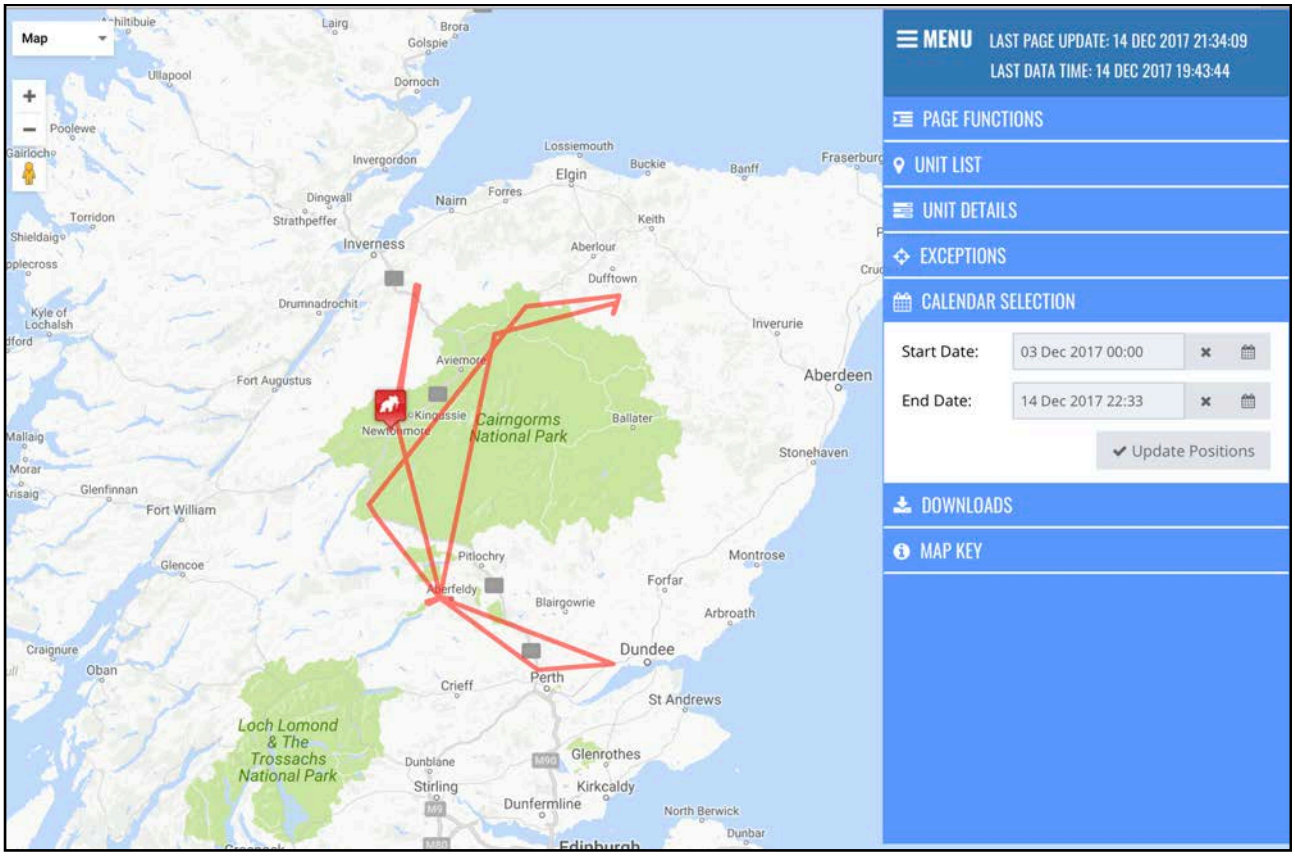
Clicking on the Unit List will reveal all units.



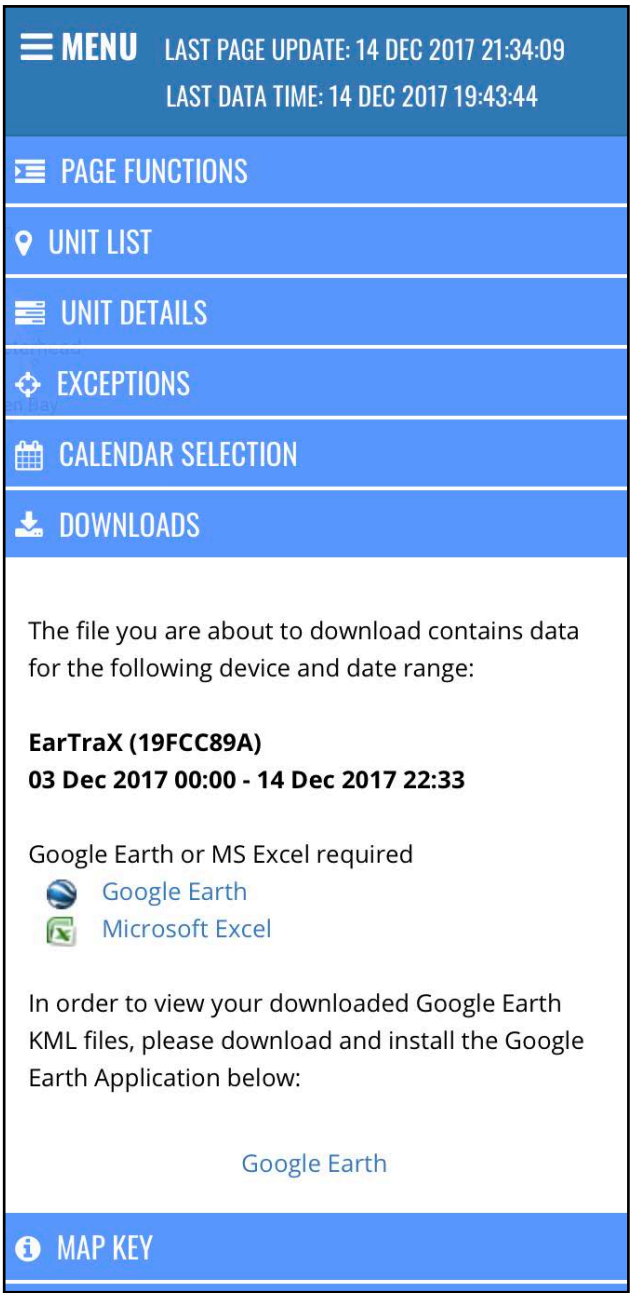
Click on Calendar Selection and the window below will appear. The dates selected are the dates for interrogating our server to receive data already collected from the collar or tag. Click “Show Trail” in the unit dialogue box and the trail of locations within the selected calendar range will be displayed on the map.



Trail of an EarTraX unit under test in Scotland over a period of 11 days.



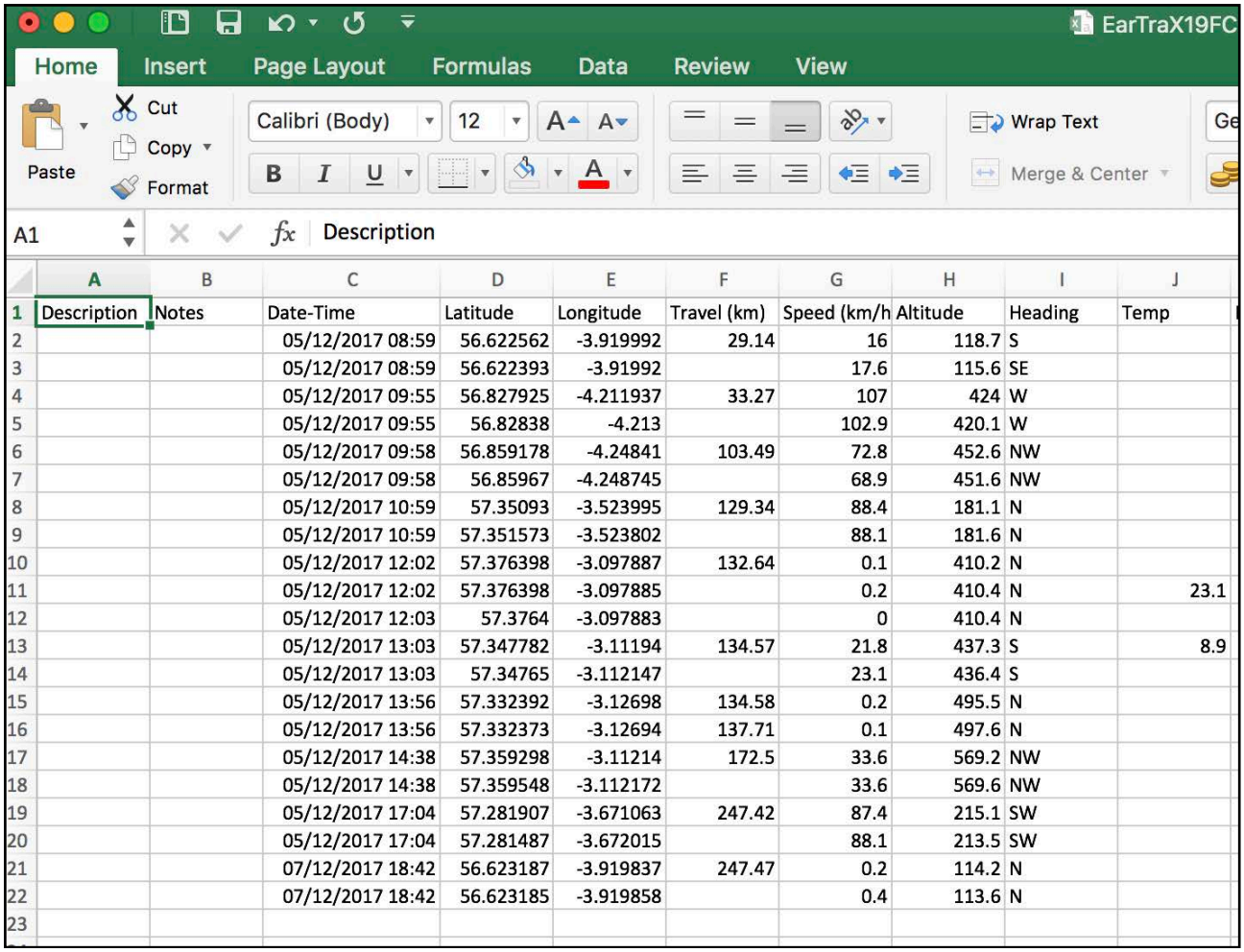
To download data, click on Downloads. Data can be downloaded as a Google Earth .kmz file or a Microsoft Excel .csv File. Once clicked an orange or green dialogue box will appear indicating the progress of download. The file will appear in your Downloaded Files.



At present the Microsoft Excel is as displayed below…

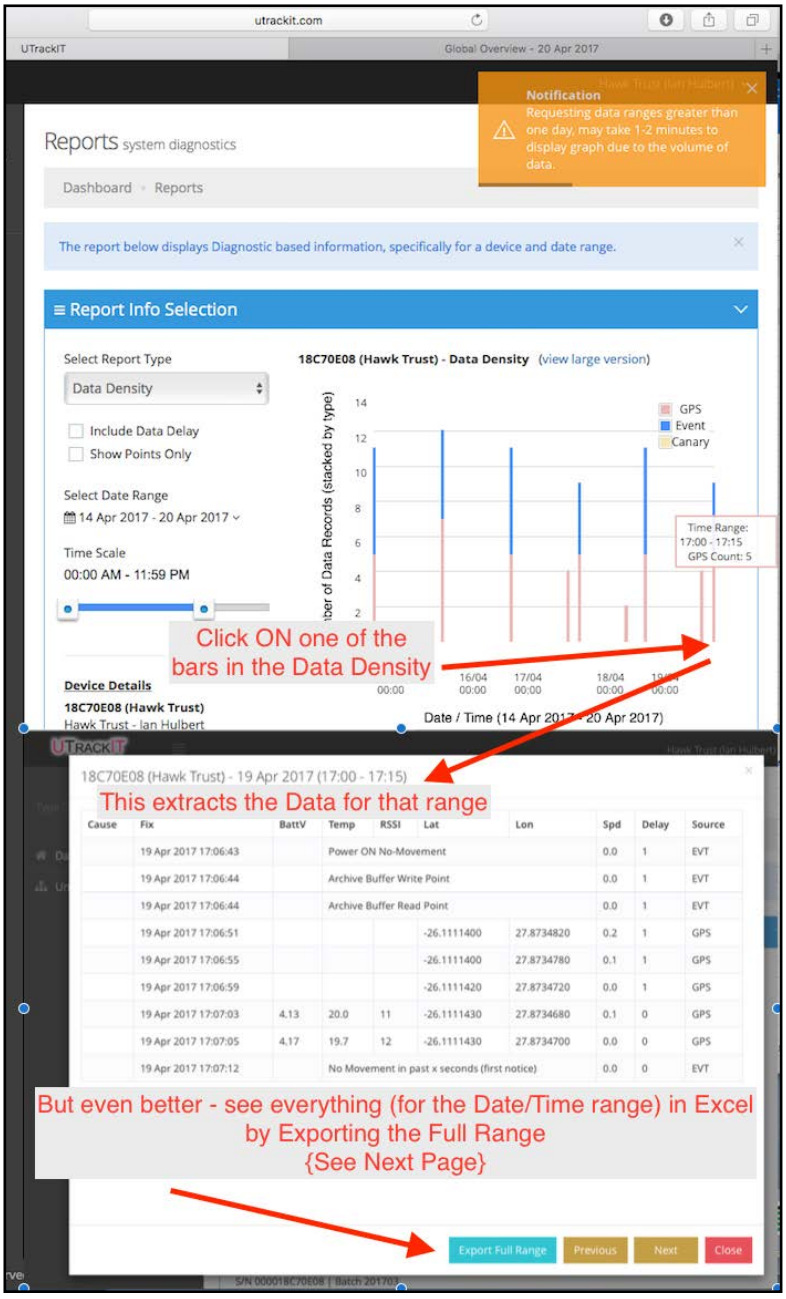
Other data such as HDoP, satellite number, accelerometer data will be displayed shortly and can be downloaded retrospectively.

Remember that if the unit is within 3G range, then ALL the data will be transmitted to our servers and which can then be downloaded. However, if the unit can only communicate with SMS, then only the last data point is transmitted and can then be downloaded. At first sight this would then appear that all the other data is lost. However, remember that all data is archived on the unit and can be downloaded later with a batch file data dump. When this occurs the missing data is then filled in.



	A	B	C	D	E	F	G	H	I	J
1	Description	Notes	Date-Time	Latitude	Longitude	Travel (km)	Speed (km/h	Altitude	Heading	Temp
2			05/12/2017 08:59	56.622562	-3.919992	29.14	16	118.7	S	
3			05/12/2017 08:59	56.622393	-3.91992		17.6	115.6	SE	
4			05/12/2017 09:55	56.827925	-4.211937	33.27	107	424	W	
5			05/12/2017 09:55	56.82838	-4.213		102.9	420.1	W	
6			05/12/2017 09:58	56.859178	-4.24841	103.49	72.8	452.6	NW	
7			05/12/2017 09:58	56.85967	-4.248745		68.9	451.6	NW	
8			05/12/2017 10:59	57.35093	-3.523995	129.34	88.4	181.1	N	
9			05/12/2017 10:59	57.351573	-3.523802		88.1	181.6	N	
10			05/12/2017 12:02	57.376398	-3.097887	132.64	0.1	410.2	N	
11			05/12/2017 12:02	57.376398	-3.097885		0.2	410.4	N	23.1
12			05/12/2017 12:03	57.3764	-3.097883		0	410.4	N	
13			05/12/2017 13:03	57.347782	-3.11194	134.57	21.8	437.3	S	8.9
14			05/12/2017 13:03	57.34765	-3.112147		23.1	436.4	S	
15			05/12/2017 13:56	57.332392	-3.12698	134.58	0.2	495.5	N	
16			05/12/2017 13:56	57.332373	-3.12694	137.71	0.1	497.6	N	
17			05/12/2017 14:38	57.359298	-3.11214	172.5	33.6	569.2	NW	
18			05/12/2017 14:38	57.359548	-3.112172		33.6	569.6	NW	
19			05/12/2017 17:04	57.281907	-3.671063	247.42	87.4	215.1	SW	
20			05/12/2017 17:04	57.281487	-3.672015		88.1	213.5	SW	
21			07/12/2017 18:42	56.623187	-3.919837	247.47	0.2	114.2	N	
22			07/12/2017 18:42	56.623185	-3.919858		0.4	113.6	N	
23										

The status of the data can be further interrogated to obtain more information such as temperature and battery voltage and where data is missing etc.


utrackit.com
UTrackIT
Global Overview - 20 Apr 2017
Notification
Requesting data ranges greater than one day, may take 1-2 minutes to display graph due to the volume of data.
Reports system diagnostics
Dashboard • Reports
The report below displays Diagnostic based information, specifically for a device and date range.
≡ Report Info Selection
Select Report Type
Data Density
Include Data Delay
Show Points Only
Select Date Range
14 Apr 2017 - 20 Apr 2017
Time Scale
00:00 AM - 11:59 PM
18C70E08 (Hawk Trust) - Data Density (view large version)
GPS
Event
Canary
Time Range: 17:00 - 17:15
GPS Count: 5
Click ON one of the bars in the Data Density
Device Details
18C70E08 (Hawk Trust)
Hawk Trust - Ian Hulbert
Date / Time (14 Apr 2017 - 20 Apr 2017)
18C70E08 (Hawk Trust) - 19 Apr 2017 (17:00 - 17:15)
This extracts the Data for that range
But even better - see everything (for the Date/Time range) in Excel by Exporting the Full Range
{See Next Page}
Export Full Range
Previous
Next
Close

	A	B	C	D	E	F	G	H	I	J	K
1	Cause	Fix	BattV	Temp	RSSI	Lat	Lon	Spd	Delay	Data Type	Annotation
2		14/04/2017 18:07				-26.1111483	27.873428	-	1	EVT	Archive Buffer Write Point
3		14/04/2017 18:07				-26.1111483	27.873428	-	1	EVT	Archive Buffer Read Point
4		14/04/2017 18:07				-26.1111483	27.873428	-	1	EVT	Power-ON Reset (Time-linked settings cleared).
5		14/04/2017 18:08				-26.1111483	27.873428	-	0	EVT	No Movement in past x seconds (first notice)
6	T	14/04/2017 18:08				-26.11099	27.87366	0.7	1	GPS	
7	T	14/04/2017 18:08	4.18	15.1	11	-26.110992	27.873643	0.3	1	GPS	
8	T	14/04/2017 18:08				-26.110993	27.873635	0.3	1	GPS	
9	T	14/04/2017 18:08				-26.111002	27.873615	0.1	1	GPS	
10	T	14/04/2017 18:08	4.28	15.5	11	-26.111007	27.873597	0.4	1	GPS	
11		14/04/2017 18:09				-26.1110067	27.873597	-	0	EVT	No Movement - device to shut off (second notice)
12		15/04/2017 18:07				-26.1110067	27.873597	-	1	EVT	Power-ON Reset (Time-linked settings cleared).
13		15/04/2017 18:07				-26.1110067	27.873597	-	1	EVT	Archive Buffer Write Point
14		15/04/2017 18:07				-26.1110067	27.873597	-	1	EVT	Archive Buffer Read Point
15		15/04/2017 18:07				-26.1110067	27.873597	-	1	EVT	Power ON No-Movement
16		15/04/2017 18:08				-26.1110067	27.873597	-	0	EVT	No Movement in past x seconds (first notice)
17	T	15/04/2017 18:08				-26.111125	27.87323	0.1	1	GPS	
18	T	15/04/2017 18:08				-26.111125	27.873253	0.8	1	GPS	
19	T	15/04/2017 18:08	4.18	17.5	11	-26.111123	27.873265	0.1	0	GPS	
20	T	15/04/2017 18:08				-26.111123	27.873267	0.4	1	GPS	
21	T	15/04/2017 18:08	4.22	17.9	11	-26.111122	27.873267	0.1	1	GPS	
22	T	15/04/2017 18:15				-26.111125	27.873183	0.7	1436	GPS	
23	T	15/04/2017 18:15	4.17	17.8	8	-26.111128	27.873187	0.1	1436	GPS	
24		16/04/2017 18:10				-26.1111283	27.873187	-	1	EVT	Power ON No-Movement
25		16/04/2017 18:10				-26.1111283	27.873187	-	1	EVT	Power-ON Reset (Time-linked settings cleared).
26		16/04/2017 18:10				-26.1111283	27.873187	-	1	EVT	Archive Buffer Read Point
27		16/04/2017 18:10				-26.1111283	27.873187	-	1	EVT	Archive Buffer Write Point
28		16/04/2017 18:11				-26.1111283	27.873187	-	0	EVT	No Movement in past x seconds (first notice)
29	T	16/04/2017 18:11				-26.11114	27.873312	0.1	1	GPS	
30	T	16/04/2017 18:11	4.23	18.4	9	-26.11114	27.87331	0.4	1	GPS	
31	T	16/04/2017 18:11				-26.111148	27.873342	0.5	1	GPS	
32	T	16/04/2017 18:11				-26.111148	27.873357	0.2	1	GPS	
33	T	16/04/2017 18:11	4.24	18.9	9	-26.11115	27.873375	0.3	1	GPS	
34		16/04/2017 18:12				-26.11115	27.873375	-	0	EVT	No Movement - device to shut off (second notice)
35	T	17/04/2017 14:07				-26.111125	27.873407	1.0	249	GPS	
36	T	17/04/2017 14:07				-26.111123	27.87341	0.4	249	GPS	
37	T	17/04/2017 14:13				-26.11114	27.873377	0.2	243	GPS	
38	T	17/04/2017 14:13				-26.111132	27.873392	0.2	243	GPS	
39		17/04/2017 18:15				-26.1111317	27.873392	-	1	EVT	Power ON No-Movement
40		17/04/2017 18:15				-26.1111317	27.873392	-	1	EVT	Archive Buffer Read Point
41		17/04/2017 18:15				-26.1111317	27.873392	-	1	EVT	Archive Buffer Write Point
42	T	17/04/2017 18:15				-26.110942	27.873028	0.5	1	GPS	
43	T	17/04/2017 18:15				-26.110947	27.87302	0.1	1	GPS	
44	T	17/04/2017 18:15	4.21	17.5	12	-26.110952	27.873015	0.3	0	GPS	
45	T	17/04/2017 18:15				-26.110953	27.873013	0.1	1	GPS	
46	T	17/04/2017 18:15	4.21	17.9	11	-26.110955	27.873007	0.3	1	GPS	
47		17/04/2017 18:15				-26.110955	27.873007	-	1	EVT	No Movement in past x seconds (first notice)
48	T	18/04/2017 10:28				-26.111113	27.873385	0.4	394	GPS	
49	T	18/04/2017 10:29				-26.11111	27.873387	-	393	GPS	
50	T	18/04/2017 10:34				-26.11111	27.873397	-	388	GPS	
51	T	18/04/2017 10:34	4.18	19.4	11	-26.111112	27.873388	0.1	388	GPS	
52		18/04/2017 17:01				-26.1111117	27.873388	-	2	EVT	Power-ON Reset (Time-linked settings cleared).
53		18/04/2017 17:01				-26.1111117	27.873388	-	2	EVT	Archive Buffer Read Point
54		18/04/2017 17:01				-26.1111117	27.873388	-	2	EVT	Archive Buffer Write Point
55		18/04/2017 17:01				-26.1111117	27.873388	-	2	EVT	Power ON No-Movement
56		18/04/2017 17:02				-26.1111117	27.873388	-	1	EVT	No Movement in past x seconds (first notice)
57	T	18/04/2017 17:03				-26.111212	27.873092	0.4	1	GPS	
58	T	18/04/2017 17:03	4.31	20	10	-26.111213	27.87309	0.3	0	GPS	
59	T	18/04/2017 17:03				-26.111215	27.873087	-	1	GPS	
60	T	18/04/2017 17:03				-26.111215	27.873085	0.1	1	GPS	
61	T	18/04/2017 17:03	4.24	20.5	11	-26.11122	27.873075	0.1	1	GPS	
62		18/04/2017 17:03				-26.11122	27.873075	-	1	EVT	No Movement - device to shut off (second notice)