Lotek

PinPoint Argos GPS Tags

USER MANUAL

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#MGPS002

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1. Introduction

This manual explains the user interface for the PinPoint Argos tags, how to set up the tag for deployment, and how to retrieve the data.

Currently Argos data transfer is in one direction, therefore data are uploaded a number of times to ensure satisfactory transfer.

2. Getting Started

All tags must be tested before deployment, to learn about how they work and ensure you will be collecting the data you expect.

To program a PinPoint tag for testing or deployment, you will need the following items:

- DLC USB Interface reader.
- A laptop or a desktop PC, running Windows 7, 8.1 or 10 (macOS or Linux/UNIX versions are not available).
- PinPoint Host installation software (available via a USB Flash Drive or downloaded from a secure link supplied by Lotek.
- PinPoint Tag to be programmed.

DLC-2 Interface & USB Cable

The DLC-2 which is a newer version of the DLC-1 and provides higher throughput when downloading large amounts of data (such as activity). The PinPoint Host application and tags will work with either interface.

2.1. Installing the PinPoint Host Application

When a DLC Interface is connected to the PC running Windows 7, 8.1 or 10 for the first time, your computer should automatically install the necessary drivers. Please make sure the internet connection is available because Windows needs to obtain the driver software from Windows Update. If the driver fails to load automatically refer to Appendix A.

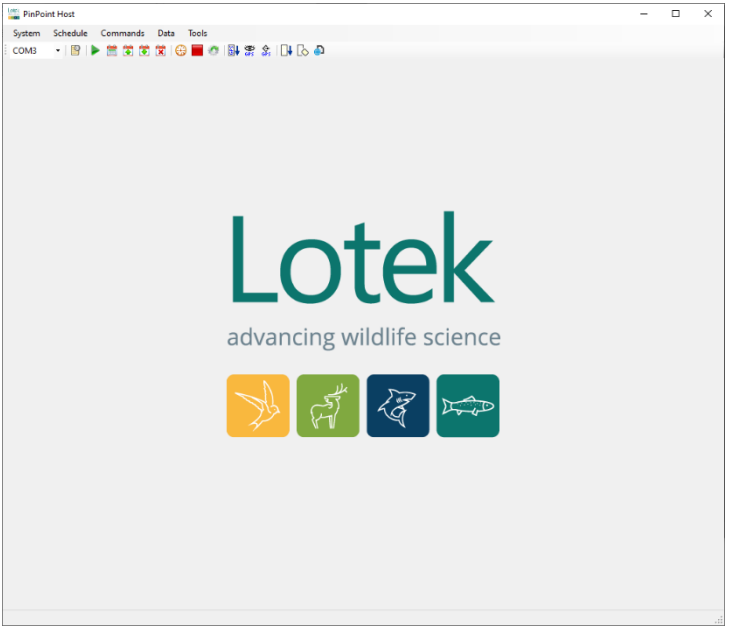
Insert the flash drive containing the software, open the folder and find the PinPoint installation software icon. If you have downloaded the software via the emailed links, this should go into the Download Folder, which needs to be extracted prior to install. Double click on the icon and proceed through the installation wizard. The installation software will create a Lotek Wireless subfolder directory in your Program Files folder. PinPoint software will be installed in its own subfolder.

Important: If .Net Framework 4 is not installed on the PC, the installation program will download it from the internet and install it. Therefore, please make sure the PC has an internet connection available during installation.

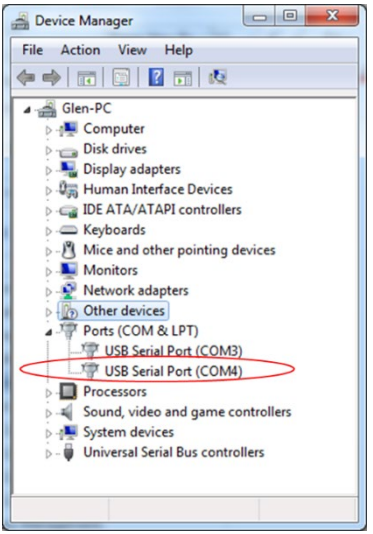
Note: If you have downloaded the PinPoint Host application via an FTP server or via a secure email link, unzip the folder before installing.

2.2. Starting PinPoint Host

Connect the DLC Interface USB cable to any USB port on your PC. Start the PinPoint Host application. The initial start-up screen will look like this:



First, select the correct 'Com port' by clicking the down arrow and selecting the right port. If you are unsure about which port to select, go to the Control Panel (select View by Small icons) Device Manager. Click on 'Ports (COM & LPT) and look for the USB Serial Port, which in this example is COM4

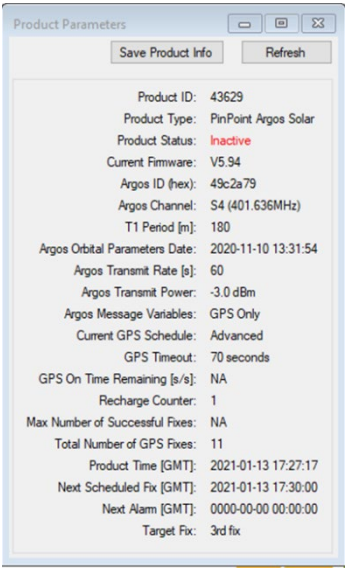


Connect the PinPoint Tag to the DLC Interface by clipping the small retractable hooks (to open the clip, push down on the back as shown in picture below) to each loop (or Pin) on the tag.

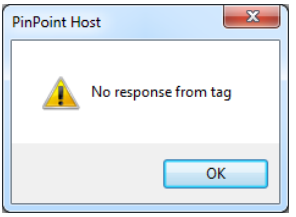
If this is successful, the 'COM' light on the Interface will turn green. The DLC is also used to charge the battery in the PinPoint Tag and on connection the 'CHRG' (Charge) light will turn on. A red light indicates the tag is charging while a green light indicates the tag is fully charged.

To confirm that the tag is communicating, select the 'Show Tag Parameters' Icon.

A small window showing the tag parameters will appear



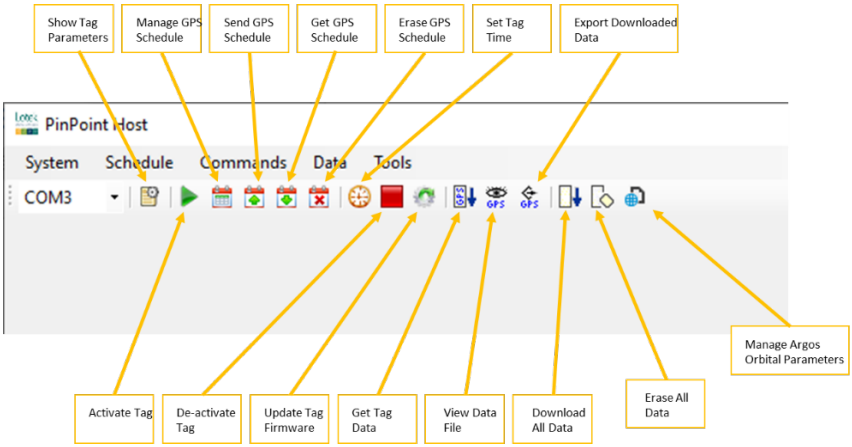
Or if the tag is not communicating then the following error message will appear.



If this is the case, check that the retractable hooks on the interface are making a good contact and try again.

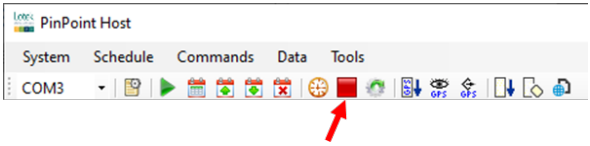
2.3. Initial Setup before Deployment

On the PinPoint Host main window there are many options which can be initiated either by using the 'Drop Down' menus or clicking on the Icons. The commands available are:

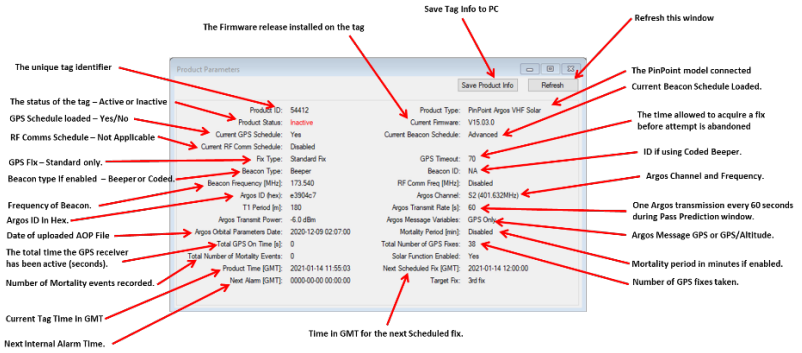


These commands will be described in later sections. If you click on the Schedule option, it allows you to manage schedules for all tags. Please note that some options may not apply to the tags you are deploying.

Before the tag is set up, make sure it is not 'Active' by clicking the Deactivate Tag icon or selecting the option from the drop down 'Commands' menu.

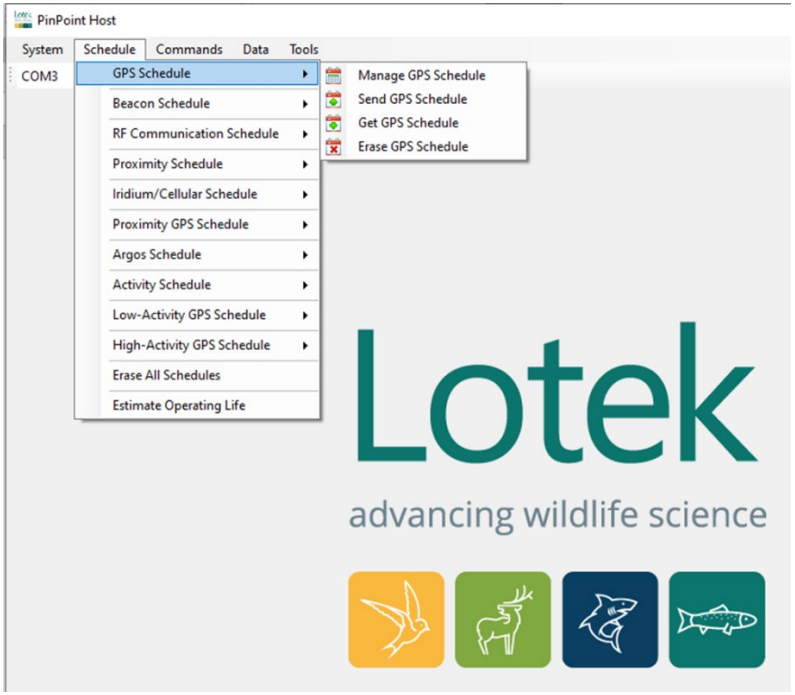


It is useful to understand the pre-set parameters that are configured on the PinPoint tag depending on which one is being used. If you click on the 'Show Tag Parameters' Icon then the window below appears. The meaning of some of the parameter is shown with the red arrows. This screen will also confirm that the tag is Inactive.



2.4. Configuring Schedules

Depending on the PinPoint Argos model you have, there are several schedules (associated with tag functionality) that can be programmed. Looking at the Schedule pulldown menu you will see many different schedule types.



For the Standard PinPoint Argos (normal and Solar) only the GPS schedule is applicable. The GPS schedule has only 4 options:

- Manage: Create, save, recall and edit Schedules.
- Send: Send (Upload) saved Schedule to connected tag
- Get: Download Schedule from tag.
- Erase: Erase Schedule from tag.

NOTE:

- In the list of schedules available there is one called 'Argos Schedule' This IS NOT applicable to PinPoint Argos tags. DO NOT USE.

- The tag is configured to transmit to Argos automatically after 3 good GPS fixes have been taken (for Pass Prediction tags) or after a set number of fixes (for non-Pass Prediction tags).

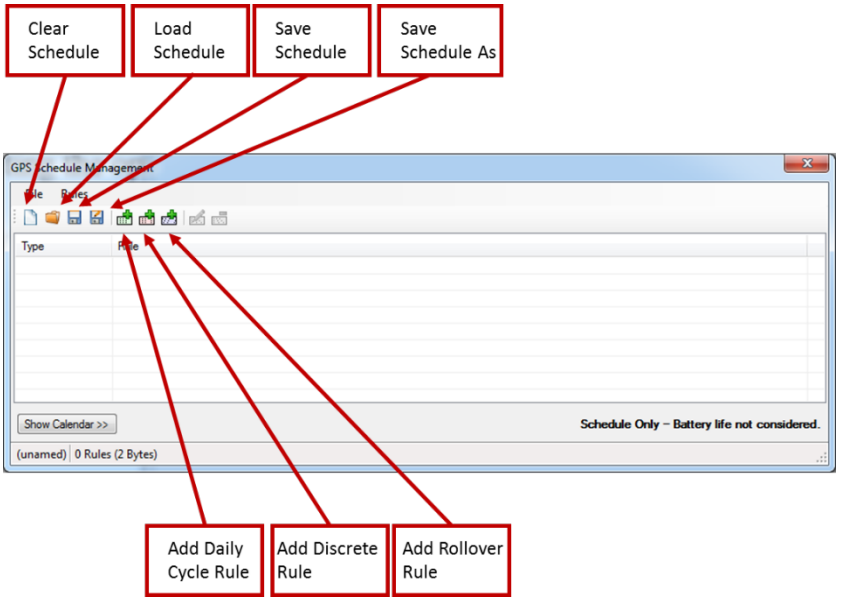
For the PinPoint Argos Solar VHF tag, there is an additional Beacon schedule. Only the advanced schedule is applicable.

2.4.1. Configuring the GPS Schedule

The GPS operation supports Standard Fixes where the GPS receiver is switched on (at the scheduled time) and the tag position in memory. The GPS receiver can stay 'on' for a maximum of 70 seconds to record a fix. If the time between two scheduled fixes is less than 2 hours, then the second fix is called a 'Warm' start, and uses information from the first fix to reduce the GPS receiver on time. If the fix interval is greater than 2 hours, it is called a 'Cold' start.

The GPS schedule, of which there are 3 types, can be created by selecting the 'Manage Schedule' Icon or selecting the option from the drop down 'Schedule' menu.

This window will appear and has a number of options

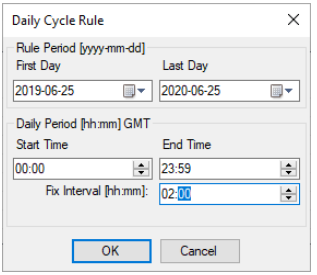


The first four icons are associated with the management of the Schedule such as load, save, etc. However, the setting up of the schedule is defined by a set of rules. Three rules can be applied to the PinPoint Tag.

- Daily Cycle Rule.
- Discrete Rule.
- Rollover Rule.

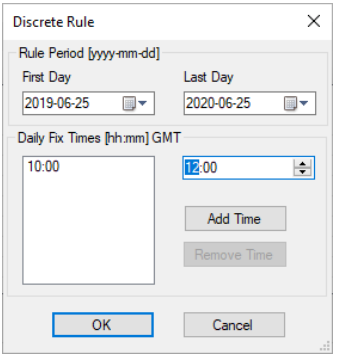
Please note that the time is always in **UTC (GMT),** because the satellite messages, and therefore the locations, are always in that zone. If you are in a different time zone, then all rules will need to take into account the local time difference. It is best to experiment by programming a schedule and checking that it is collecting locations at the correct time, before re-charging and deploying the tag in the field. Whichever rule is used, the GPS fix interval cannot be less than 20 minutes.

2.4.2. Daily Cycle Rule



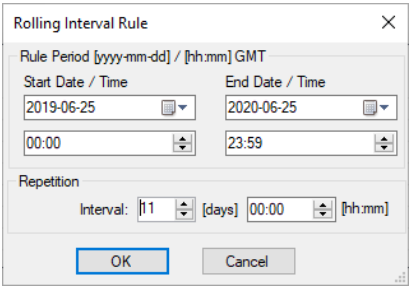
This rule sets up a daily schedule between two dates (Rule Period). Each day can be set up to take fixes at a specific interval (Fix Interval) over a specified time period (Start Time to End Time). The number of fixes is not defined, it is determined by the period and interval.

2.4.3. Discrete Rule



This rule sets up a daily schedule of individual (discrete) fixes between two dates (Rule Period). Fixes can be scheduled at one or more specific times (Daily Fix Times).

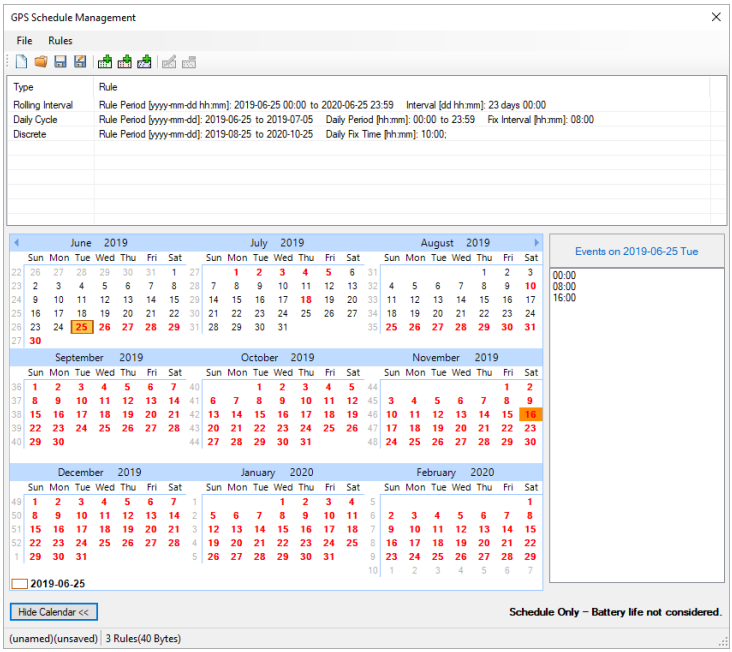
2.4.4. Rollover Rule



This rule sets up a rolling schedule between two dates. This differs from the Daily Cycle Rule in that the schedule does not begin afresh each day but rolls over according to the Repetition Fix Interval. A fix is taken at the Start Date /Time and thereafter at the specified Fix Interval until the End Date / Time. The interval can be set from 1 minute to 1000 days.

All three rules can be applied individually or together many times to support the needs of your study. You can add multiple Discrete, Daily Cycle or Rolling Interval rules to the Schedule. For example, you may want to monitor a bird over a one-year period and take a fix on a specific day each month (Rollover rule) but then be able to take a number of fixes during the wintering period where more detail is required (Daily Cycle Rule).

On the Schedule Management Window, the Calendar can be displayed by clicking the 'Show Calendar' Button. If no Schedule has been specified, the calendar dates will be Black. If a Schedule has been entered, then the dates affected are marked Red with the details in the 'Event' pane. Click 'Hide Calendar' to remove Calendar display.



Once you have created your Schedule by adding the rules(s), save it by clicking the 'Save Schedule' Button.

If you have an existing Schedule already saved on your PC, you can load it by clicking the 'Load Schedule' button. This can then be edited if required and then saved using the existing name or another name (or location) using the 'Save Schedule As' button.

Important: When setting up the schedule, the battery life is not taken into consideration. Lifetime estimates are available using the Lifetime Estimator under the Schedule menu (see section 2.4.6 for more detail).

Once the Schedule is completed, it can be loaded onto the PinPoint tag using the 'Send Schedule' button on the main PinPoint Host window (or use the Schedule pull-down). You will be asked for the location of the saved Schedule on your PC.

Another option is to download the existing schedule from a PinPoint tag by clicking the 'Get Schedule' button on the main PinPoint Host window (or use the Schedule pull-down). You will be asked where you would like to save the Schedule on your PC before being able to open it.

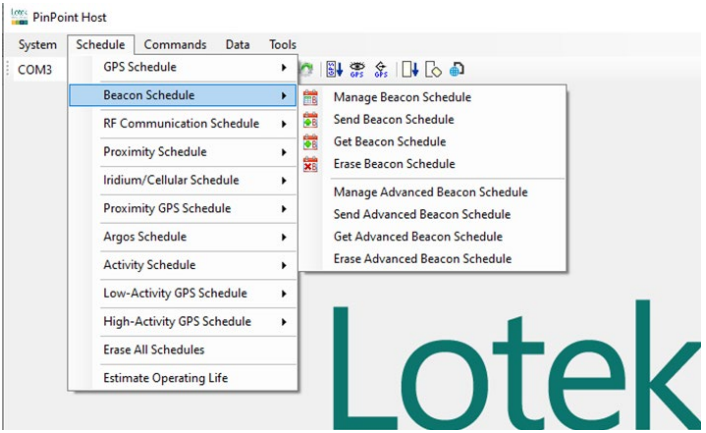
When you load the schedule onto the PinPoint you may be asked to confirm if you wish to 'Erase previous data'.

A Schedule can be erased from a PinPoint tag by clicking the 'Erase Schedule' button on the main PinPoint Host window (or use the Schedule pull-down).

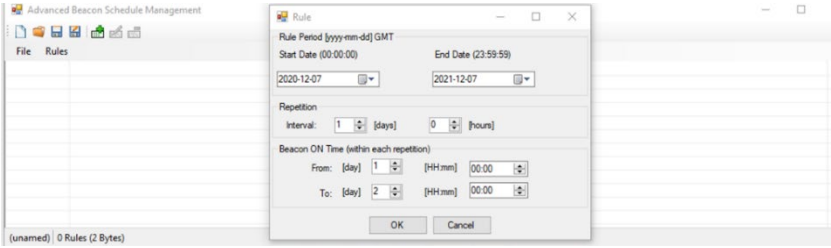
Important: Before deployment remember to activate the tag.

2.4.5. Beacon Schedule

Clicking on the Schedule pulldown then selecting the Beacon Schedule you will see both the Normal Beacon and Advanced Beacon schedule. Only the Advanced schedule is applicable to PinPoint Argos Solar VHF tags (Other Argos tags do not support a Beacon).

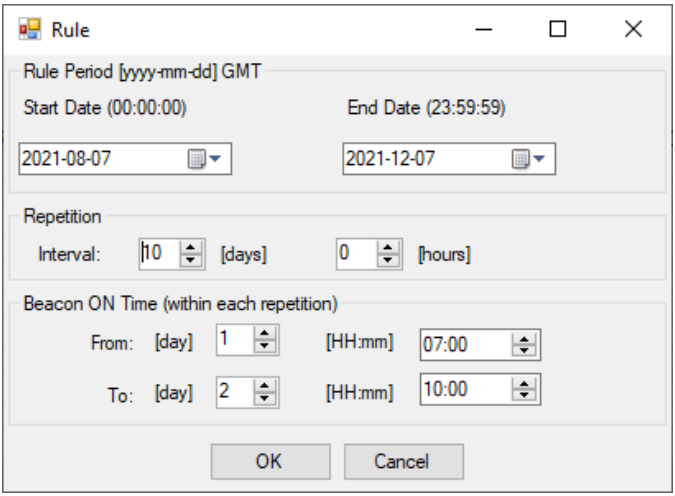


Selecting 'Manage Advanced Beacon Schedule' you will see only one rule icon is allowed (not greyed out) called 'Beacon Rule'



With this rule you select a start and end date for the Beacon, then specify a repetition interval in days and/or hours. You can then specify a Beacon on time within that repetition interval.

For example:

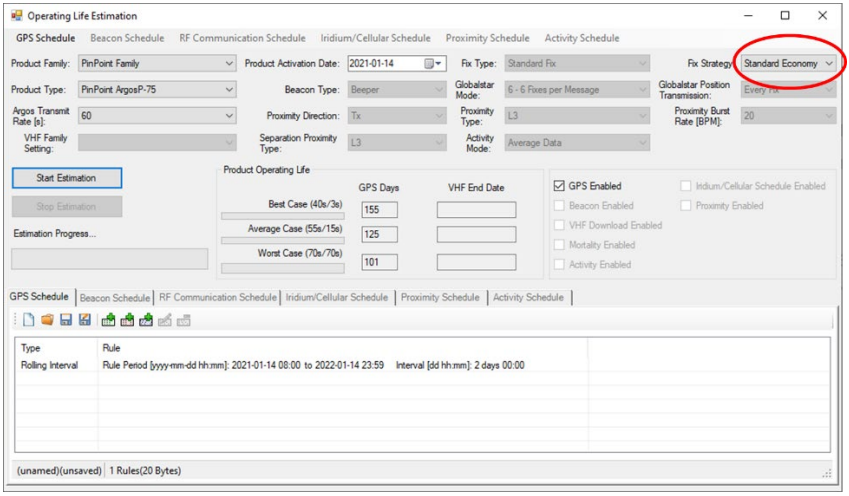


Here is a schedule set to operate over 4 months with a repetition interval of 10 days. The Beacon on time will be on at 07:00 on day 1 to 10:00 on day 2 within the 10-day Repetition interval (on for 27 hours every 10 days, within a 5-month period).

2.4.6. Estimation of Non-Solar PinPoint Argos Tag Life

Under the Schedule tab there is an option to select the Operating Lifetime Estimation calculator. This will allow the user to enter their proposed schedule(s) and the calculator will estimate the lifetime of the tag based on best, normal and worst-case conditions which is coarsely related to the bird's behaviour or habitat (open sky to under canopy).

There is an option to set the Fix strategy to Standard Economy or Standard Intensive (Programmed prior to shipping). The Intensive setting extends the GPS timeout, which may help if the tag cannot communicate well with the satellites (e.g., if a Bird spends a large time under thick canopy). This means the GPS receiver is left operating for longer, which increases battery consumption and probably reduces the overall number of possible fixes. Select the correct fix strategy when using the estimator.



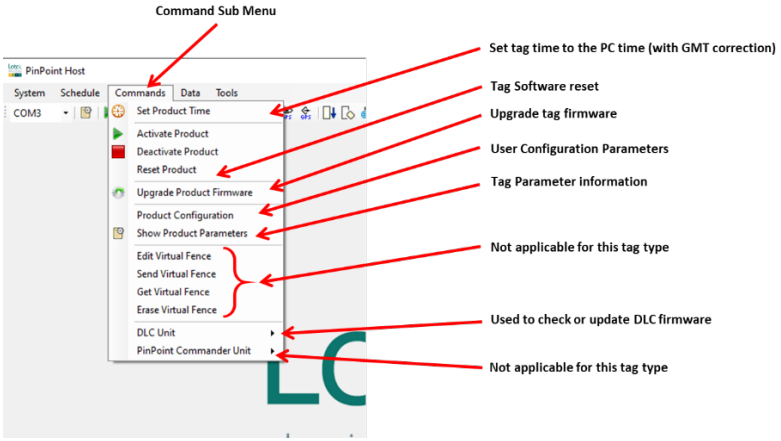
Once all the GPS schedule have been entered, select 'Product activation date' followed by clicking the 'Start Estimation' button. The Operating Life Estimator provides the number of GPS days for the tags based on the "best, normal and worst" conditions. This relates to the time taken to get a GPS fix. For Standard Economy fix, the GPS 'On' time is 40 seconds best case, 55 seconds average and 70 seconds worst case.

2.4.7. Estimation of Solar PinPoint Argos Tag fix period

With solar tags, the operation life calculator is not applicable. Instead Lotek can provide an estimate of the number of fixes that can be taken per day/week over a 5-year period. Contact your Telemetry Specialist to receive the appropriate form to complete.

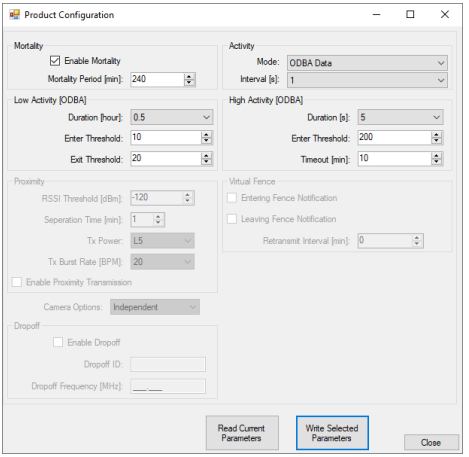
2.5. Commands Menu

The PinPoint Host has a 'Commands' pulldown menu. This provides many options of which some are selectable from the top Icon bar.



Should you need to upgrade the firmware on any of the hardware products then use the correct version as advised by Lotek.

Selecting the Product configuration option, the following window is displayed.



The ‘Read Current Parameters’ button needs to be pressed first to update the page with the current values. Changing any value requires the ‘Write Select Parameters’ button to be clicked to update the tag.

2.5.1. Mortality configuration

The PinPoint Argos Solar Tags can be configured with an optional Mortality feature that can be activated if desired. This feature samples movement (6 times per second) and analyses the average value over 5-minute periods.

The user can program a time period (default 4 hours) for mortality to be declared. Should the activity fall below a factory pre-set value for the mortality time period, the tag declares mortality. This causes the beacon (if applicable) to change its rate and transmit quick pulses to alert anyone radio-tracking the animal. The VHF beacon changes its rate from 40bpm to 80bpm, but pulses are half their original width, which produces a unique audible sound.

The mortality event exact time and date is stored in the tag memory and can be read upon tag recovery by clicking the 'Get Mortality Events' command located under 'Data' tab.

In case of a 'false' mortality, when activity resumes, the unit's beacon will revert to normal mode, however the mortality event time stamp and its cancellation will be stored in memory. The tag will exit mortality based on 2 or more movements, exceeding the (factory) pre-set value, within three consecutive 5-minute periods.

A Mortality event message will also be sent via Argos.

3. Argos Message types.

Accessing data from the Pinpoint Argos tags will mainly be via the Argos System Website or via Movebank. The data is contained within a fixed message size. Depending what data is required will define the number of messages that will be sent. The same Data will be sent a few times to ensure a high probability it is delivered (Tags only send data to satellites, with no acknowledgement).

3.1. Argos Message Types (Pass Prediction)

After the 3rd successful GPS fix, the Pass Prediction Algorithm is initiated and the 3 GPS fixes are transmitted when the next Argos Satellite is overhead. The tag uses the last good fix and data contained within the Argos Orbital Parameter (AOP) file, to calculate when a satellite will be overhead. During the few minutes the satellite is overhead, the tag will transmit a message once a minute, which will contain the latest GPS fixes and up to twelve previous fixes (allowing for data that was not received before, to have another chance to reach the satellite).

PinPoint Argos tags can be configured, at the time of order, to send GPS data via Argos using two types of message format.

1. Message contains 3 GPS fixes
2. Message contains 2 GPS fixes with altitude

GPS locations are sent a number of times to increase the probability of them being received. Therefore, to obtain the same probability of receiving a location as format 1, a third more messages would need to be sent with message format 2.

PinPoint Argos VHF tags have three message options:

1. Message contains 3 GPS fixes plus battery level.
2. Message contains 2 GPS fixes with altitude and battery level.
3. Message contains 2 GPS fixes with altitude, temperature and battery level.

All three Argos VHF tag message formats can also contain a mortality notification.

3.1.1. Mortality Handling with PinPoint Argos VHF

If Mortality is enabled, then after a period of not moving a Mortality event will trigger, to alert you and provide a tag position. The Mortality event will initiate the following steps:

1. VHF beacon switches to mortality signal

2. The tag will attempt to take a GPS fix once per hour for up to 24 hours. Once a successful fix is recorded, a Mortality notification message is prepared with the successful GPS fix location.

3. If step 2 is not successful after 24 attempts, a Mortality notification will be prepared with the last stored valid GPS fix (which may be old), if one exists. The tag will continue to try to get a new GPS fix as explained in step 2 for another 24 hours. Should a good fix be recorded, another Mortality notification will be prepared with the newly acquired GPS fix.

4. Using the GPS location (whether newly acquired or last stored), the tag will calculate the next time an Argos satellite is overhead, when it will send a Mortality notification. The data will include Time when Mortality happened, last good GPS fix, Battery Voltage at time of transmission and Temperature at the last GPS fix.

5. The tag will resume the original GPS fix schedule once the notification has been sent out OR aborted (due to no new good fix taken after 24 hours and no last stored GPS fix, or there is no Argos Transmission within 24 hours fix attempt period).

6. Should the tag remain in mortality, the Mortality flag will indicate this in each new Argos message.

Note: All of above is aborted by a mortality cancelation event.

4. Battery Management.

The PinPoint Argos Solar and Non-Solar is available with many different battery sizes. The PinPoint model number is associated with the capacity on the fitted battery so the higher the number the more fixes it can attempt.

PinPoint tags monitor the battery and will allow the tag to operate and take fixes (according to the schedule) until it cannot guarantee any more successful fixes. The GPS timeout for any individual fix is pre-configured to be 70 seconds, which is the maximum period PinPoint Argos will spend trying to get a fix. If no fix is obtained within this period, the receiver will shut down to conserve battery until the next scheduled attempt. If a successful fix is obtained before the timeout, the receiver will shut down earlier.

The PinPoint Solar tag has a small lightweight solar cell that charges the battery, when light levels allow, to extend deployment time or allow additional GPS fixes. Schedules should be planned to take account of when and how much light the tags will be exposed to.

For PinPoint Argos Solar tags, if the tag is not charging sufficiently (due to reduced light levels) to maintain the programmed schedule, the battery voltage can drop. Once it reaches a certain level, the tag will stop taking anymore fixes. Once the tag has charged the battery to a higher level, the tag will switch on again and continue with the schedule.

4.1. Tag Storage and charging.

To improve tag operation, the following guidelines on charging PinPoint tags are recommended:

- If PinPoint Argos (Solar and non-solar) tags are to be stored for future use, charge them prior to storage (make sure the tag is deactivated and any data downloaded) and then put them in a dark cool environment (not a fridge or freezer). When not in use, charge the battery every 2 to 3 months or with solar tags, these can also be left out in a sunny environment.

- When a PinPoint tag is first retrieved, recharge it prior to any data download.

- When deploying tags, carry out a final charge prior to attachment to the bird.

5. Testing tags prior to Deployment.

As discussed earlier in this document, we strongly recommend that you test the tags prior to deployment to familiarise yourself with tag operation and downloading the data. During testing we would recommend the following conditions.

- Refrain from using intensive GPS schedules (<30 minutes between fixes).
- Keep the number of test and charge cycles to a minimum to maintain the battery in optimum condition for deployment.
- Do not test tags on or near metallic surfaces.
- Set the tag position so the antenna(s) is not vertical and not in contact with anything else.
- Place the tags outside with good access to the sky.
- When testing Argos tags keep them at least 2m apart at all times, otherwise this could damage the tags.
- Once testing is complete, de-activate and then recharge the tag.
- Avoid testing below 5 degrees Centigrade unless the tag can be kept warmer.

6. Final checks before Deployment.

It is recommended that you initially set the 'Tag Time' from your PC by clicking the Icon or 'Set Tag Time' from the 'Command' pull-down menu. The tag will pick up GMT from satellites once it starts taking fixes. However, the initial tag time is very random (i.e., it could be year 1980 or 2030). To make sure the tag starts taking fixes as scheduled, you need to make sure its initial tag time is fairly accurate.

Once the Schedule has been sent to the tag, it is ready to be activated. Prior to attaching the tag to the bird, connect it to the interface and make sure the battery is fully charged by looking at the 'CHRG' indicator on the DLC. If the tag is not fully charged, leave it connected to the DLC interface until the CHRG indicator turns Green. If you are deploying many PinPoint Argos tags, it is recommended to use a PinPoint GC-6 charger as this can charge up to 6 tags at a time, independent of the DLC.

It is important that you save the Tag Parameter file before and straight after every deployment. NB this has much more information than a screenshot of the Show Product Parameters.

With the DLC interface connected to a tag, click on the 'Activate Tag' Icon. Confirm the tag is activated by the 'Show Tag Parameter' screen (Section 2.3) and check the Tag Status. If all as expected, especially being "Active", remove the tag from the Interface and attach to the bird.

It is recommended that you erase the existing tag data. This is done by clicking on the 'Erase Tag Data' Icon.

In summary;

1. Set clock
2. Check all schedules are loaded
3. Save Tag Parameter file
4. Activate Tag, erasing data to free up all memory
5. Confirm tag status as activated
6. Deploy

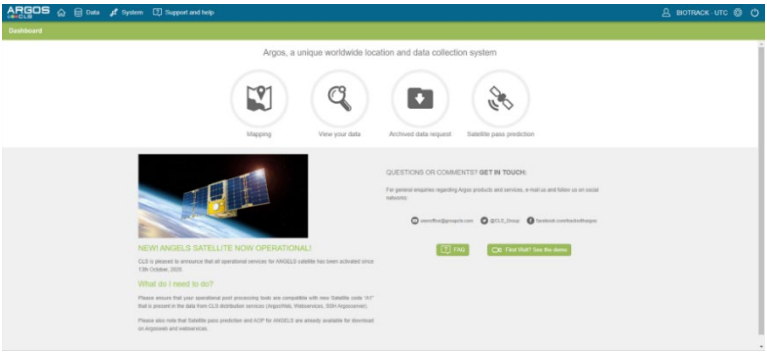
7. Downloading PinPoint data

Accessing data from the Pinpoint Argos tags will mainly be via the Argos System Website or via Movebank (if you have an account). However, you can also download data directly from the tag using the DLC interface.

7.1. Downloading data via Argos

During the study period, the data from PinPoint Argos Tags (Standard and Pass Prediction) is transmitted to the Argos Satellites, and after a few hours will be accessible via an Argos (CLS) account (set up by the user).

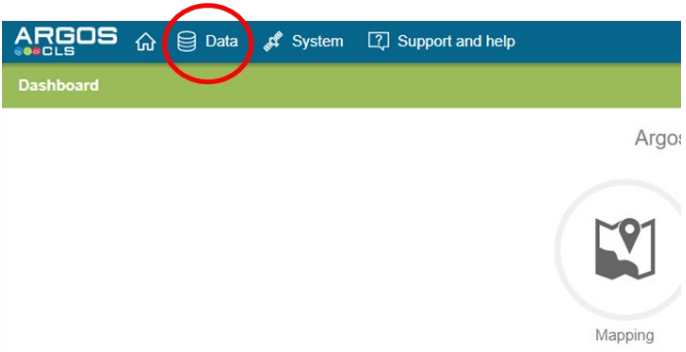
When you first access the website, you will be presented with the following window:



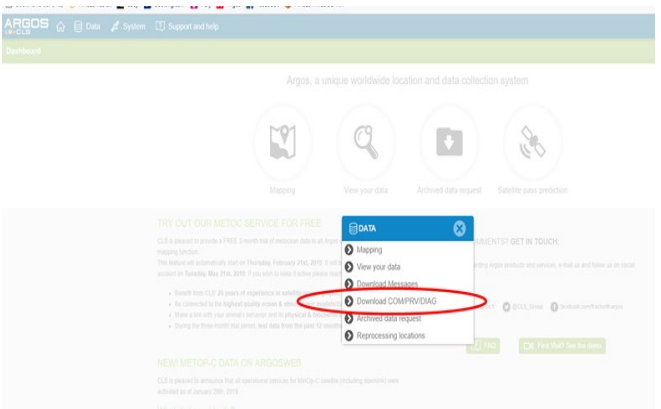
The Argos system is unable to decode the format of the GPS data that is sent by the tag but it can transfer it for you to download. The message has to be decoded using the Lotek Argos GPS Data Processor application.

It is best to opt for email updates from Argos that alert you to data being available. Otherwise, you need to check the Argos website regularly (weekly) to avoid losing the data, which is discarded after 20 days.

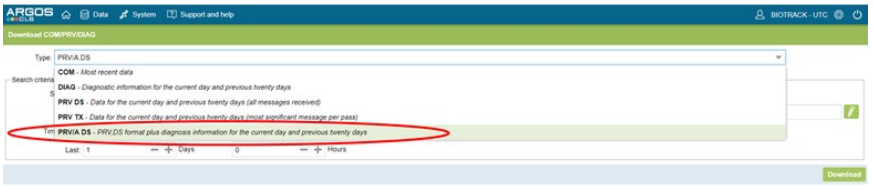
To download your GPS data, select Data from the top line.



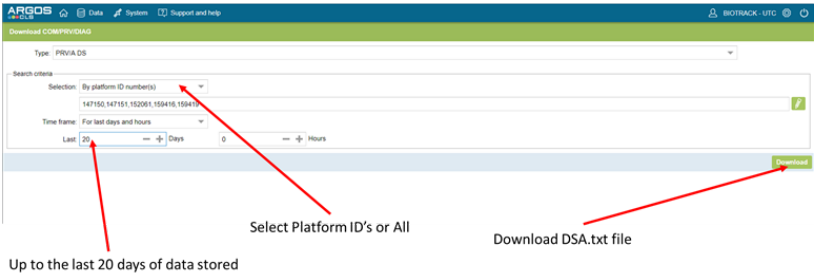
Select Download.....



Select data with diagnostic option



Download the data

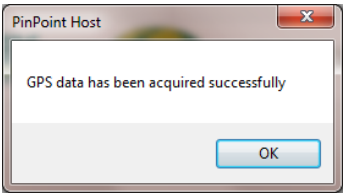


Once you have the DSA file, please use the Lotek Argos GPS Converter program to generate the GPS data. This is described in Appendix E of this manual.

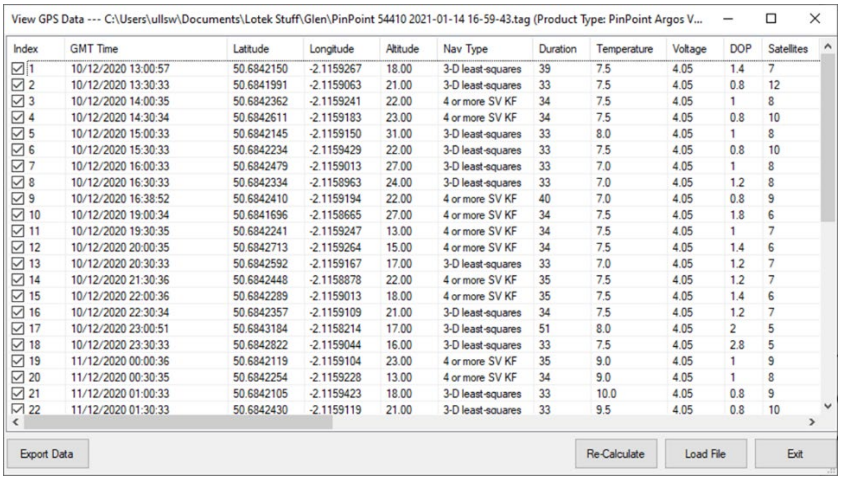
Note: This data is currently only stored for a maximum of 20 days, so should be downloaded on a regular basis.

7.2. Downloading data via the DLC

Connect the tag to the DLC, click on the 'Get Tag Data' Icon or use the drop-down menu on the 'Data' Command. You will be asked to confirm the folder where the data file is to be saved (this can be changed from the default). The file saved will have a default name that will include the Tag ID, Date and Time with a .tag suffix. If the download is successful, the following tile will appear



Once the data has been downloaded it can be viewed by clicking on the 'View Data File' Icon or using the drop-down menu on the 'Data' Command. It will then ask you for the file location (or use the default), which you need to select/confirm prior to clicking the Open button.


View GPS Data --- C:\Users\ullsw\Documents\Lotek Stuff\Glen\PinPoint 54410 2021-01-14 16-59-43.tag (Product Type: PinPoint Argos V...

Index	GMT Time	Latitude	Longitude	Altitude	Nav Type	Duration	Temperature	Voltage	DOP	Satellites
1	10/12/2020 13:00:57	50.6842150	-2.1159267	18.00	3-D least-squares	39	7.5	4.05	1.4	7
2	10/12/2020 13:30:33	50.6841991	-2.1159063	21.00	3-D least-squares	33	7.5	4.05	0.8	12
3	10/12/2020 14:00:35	50.6842362	-2.1159241	22.00	4 or more SV KF	34	7.5	4.05	1	8
4	10/12/2020 14:30:34	50.6842611	-2.1159183	23.00	4 or more SV KF	34	7.5	4.05	0.8	10
5	10/12/2020 15:00:33	50.6842145	-2.1159150	31.00	3-D least-squares	33	8.0	4.05	1	8
6	10/12/2020 15:30:33	50.6842234	-2.1159429	22.00	3-D least-squares	33	7.5	4.05	0.8	10
7	10/12/2020 16:00:33	50.6842479	-2.1159013	27.00	3-D least-squares	33	7.0	4.05	1	8
8	10/12/2020 16:30:33	50.6842334	-2.1158963	24.00	3-D least-squares	33	7.0	4.05	1.2	8
9	10/12/2020 16:38:52	50.6842410	-2.1159194	22.00	4 or more SV KF	40	7.0	4.05	0.8	9
10	10/12/2020 19:00:34	50.6841696	-2.1158665	27.00	4 or more SV KF	34	7.5	4.05	1.8	6
11	10/12/2020 19:30:35	50.6842241	-2.1159247	13.00	4 or more SV KF	34	7.5	4.05	1	7
12	10/12/2020 20:00:35	50.6842713	-2.1159264	15.00	4 or more SV KF	34	7.5	4.05	1.4	6
13	10/12/2020 20:30:33	50.6842592	-2.1159167	17.00	3-D least-squares	33	7.0	4.05	1.2	7
14	10/12/2020 21:30:36	50.6842448	-2.1158878	22.00	4 or more SV KF	35	7.5	4.05	1.2	7
15	10/12/2020 22:00:36	50.6842289	-2.1159013	18.00	4 or more SV KF	35	7.5	4.05	1.4	6
16	10/12/2020 22:30:34	50.6842357	-2.1159109	21.00	3-D least-squares	34	7.5	4.05	1.2	7
17	10/12/2020 23:00:51	50.6843184	-2.1158214	17.00	3-D least-squares	51	8.0	4.05	2	5
18	10/12/2020 23:30:33	50.6842822	-2.1159044	16.00	3-D least-squares	33	7.5	4.05	2.8	5
19	11/12/2020 00:00:36	50.6842119	-2.1159104	23.00	4 or more SV KF	35	9.0	4.05	1	9
20	11/12/2020 00:30:35	50.6842254	-2.1159228	13.00	4 or more SV KF	34	9.0	4.05	1	8
21	11/12/2020 01:00:33	50.6842105	-2.1159423	18.00	3-D least-squares	33	10.0	4.05	0.8	9
22	11/12/2020 01:30:33	50.6842430	-2.1159119	21.00	3-D least-squares	33	9.5	4.05	0.8	10

Export Data | Re-Calculate | Load File | Exit

Some PinPoint Argos tags record temperature using the built-in sensor, which has a 0.5℃ accuracy and battery voltage

The additional information recorded is described below.

Altitude – The figure for altitude should not be treated as absolute, as it depends on a few variables including DOP and the number of satellites detected. For example, if the tag is taking a fix when the bird is in flight in open sky then the altitude value will be more accurate than a fix being taken when the bird is under heavy canopy. Note: Altitude is Height above ellipsoid (https://nextnav.com/hae).

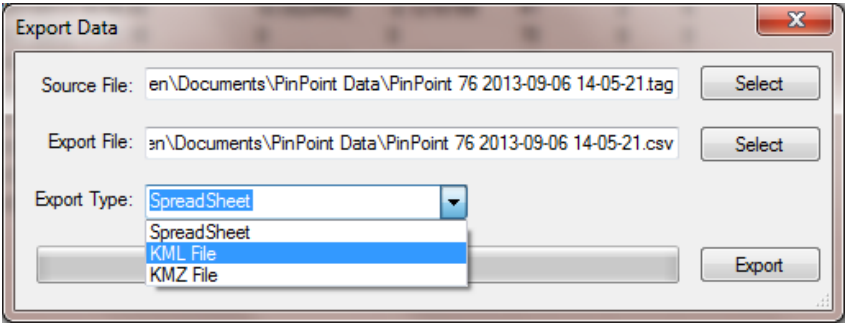
Duration – The time elapsed before a successful fix was acquired.

Dilution of Precision (DOP) - An indicator of the quality of a GPS position. It takes account of the number of satellites used, each satellite's location relative to the other satellites in the constellation, and their geometry in relation to the GPS receiver. A low DOP value indicates a higher probability of accuracy.

Satellites - The number of satellites used for the fix.

Data can be exported using the Export button on the data window shown when in the main PinPoint Host window by clicking on the 'Export Downloaded Data' Icon or using the drop-down menu on the 'Data' Command.

The following window is displayed:



Select the Source File (.tag) and the Export File, then select either a Spread Sheet (.csv) or KML/KMZ file format for importing into Google Earth, before clicking on the Export button.

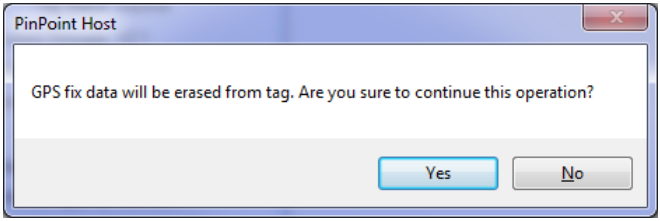
7.2.1. Download via Movebank

Movebank is a third-party system that can be linked to your Argos that will retrieve, decode and store your data. Please refer to Appendix F on how to use and set up a Movebank account.

8. Tag Reuse

The tag, if in good condition, can be reused as the battery is rechargeable. However, as the number of recharge cycles increase, the battery capacity will reduce, especially with the smaller cells.

Before re-deployment you will need to erase the internal memory by clicking on the 'Erase Tag Data' Icon or using the drop-down menu on the 'Data' Command with the PinPoint Host application.



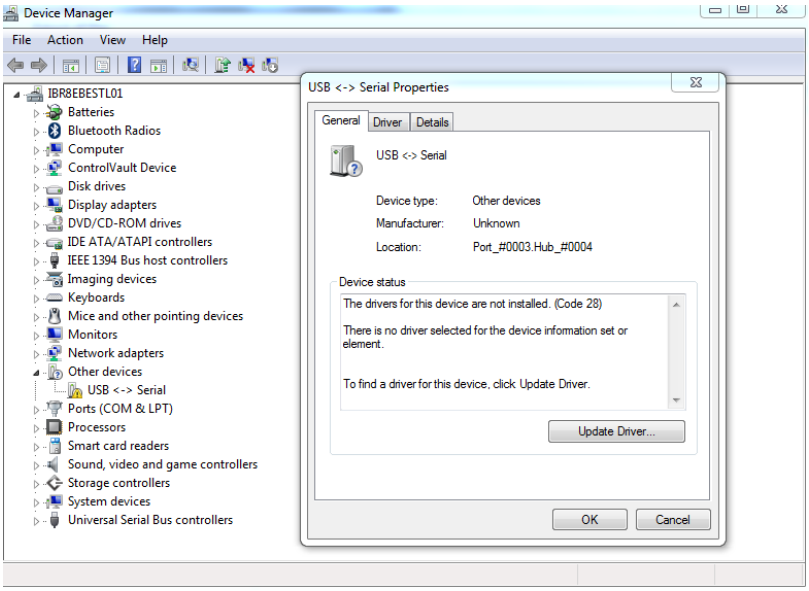
Click the 'Yes' button to confirm erasure.

9. Appendix A - Drivers

If the Driver fails to install automatically, open 'Device Manager' (from Control Panel). If you see a warning symbol under 'Other Devices'\USB <-> Serial, this indicates that the driver has not been located. Right click USB <-> Serial and select Update Driver. Select 'Browse my Computer for driver Software'. Select the location:

1. If it is 32-bit operating system, the folder will be "C:\Program Files\Lotek Wireless Inc\PinPoint Host"
2. If it is 64-bit operating system, the folder will be "C:\Program Files (x86)\Lotek Wireless Inc\PinPoint Host".

Tick 'Include Subfolders' before you click 'Next'.

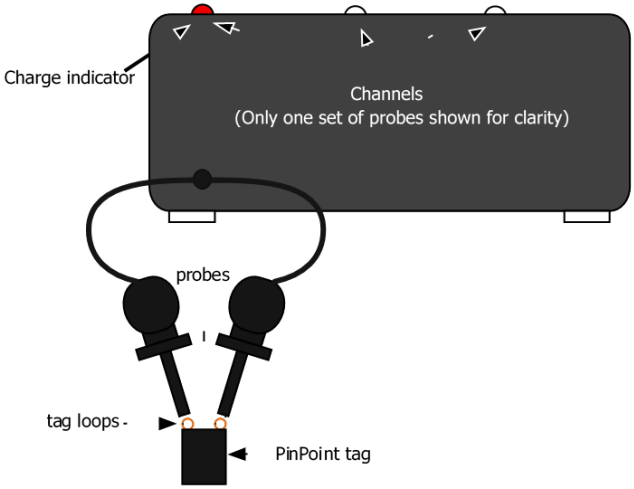


Once the driver has installed, open up 'Device Manager' and confirm the Interface has been allocated a COM port under Ports (COM & LPT).

10. Appendix B – Gang Charger

Multi-channel Charger Instructions.

This charger is only for use with PinPoint tags supplied by Lotek. Charging of any other type of tag is not supported. The model numbers supported by a charger will be listed on a label at the end. As new models are added, the firmware in an old charger will have to be upgraded in order for the new model to be charged. Please consult us if your PinPoint model is not listed or no light comes on when you connect a tag.



Only connect the charger's power supply unit (PSU) to a mains socket (100-240V) with an earth connection using the supplied cable.

For operation, connect the two probes from one channel to the tag loops (contacts) to charge the tag. Do not connect probes from adjacent channels together or connect probes from adjacent channels to the tag. The probes from one channel can be connected either way round to the tag. Switch on the mains socket after all tags have been connected to the charger.

The charge indicator will light RED during charging and turn GREEN when the tag is charged. Do not disconnect the tag while it is charging; only disconnect it when the light is GREEN. Switch off the mains power before connecting more tags.

If there is a fault, the charge indicator will flash RED; check the tag is connected properly.

If a tag is unable to communicate with the charger, e.g., due to a bad connection, it will not be charged and the charge indicator will not light.

As an example of the time, it takes to charge depleted tags, PinPoint 350 tags take approximately 10 hours to charge.

Important:

- The charger should only be used with the supplied power supply and cable.
- Do not open or disassemble the charger.

11. Appendix C - Accuracy

Accuracy for location information.

A general description of DOP values can be found are in the table below. The more satellites used for the fix, the better the accuracy. With 3 satellites it is only a 2D fix but with 4 or more satellites it is a 3D fix, however 5 or more satellites will give the best accuracy.

DOP Value	Rating	Description
< 1	Ideal	Highest possible confidence level to be used for studies demanding the highest possible precision at all times.
1 to 2	Excellent	At this confidence level, positional measurements are considered accurate enough to meet all but the most sensitive study requirements.
2 to 5	Good	Represents a level recommended as minimum for good study data.
5 to 10	Moderate	Positional measurements could be used for calculations, but the fix quality could still be improved. A more open view of the sky is recommended.
10 to 20	Fair	Represents a low confidence level. Positional measurements should be discarded or used only to indicate a very rough estimate of the current location.
>20	Poor	At this level, measurements are inaccurate by as much as 300 meters with a 6-meter accurate device (50 DOP × 6 meters) and should not be used.

12. Appendix D – Argos Satellite Services

ARGOS uses polar orbiting satellites to give global coverage. It is a unidirectional message-based service. Messages are received in real time by receiving stations throughout the world and are also stored to be forwarded when the satellite passes over one of the three main stations (in Alaska, eastern USA and Svalbard). Because there's no acknowledgement from the satellite, the message from an Argos tag is repeated several times to try and maximise the chance of good reception. ARGOS uses the Doppler effect to estimate the position of each transmitter as the message is transmitted. The accuracy of this technique ranges from 150m to 1km, depending on how many copies of the message were received by the satellite as it passes overhead.

Currently any of the 10 Argos low-orbit satellites can pass overhead (approximately a 10 minute window) and receive the messages. Messages can be viewed on the Argos website and downloaded in a spreadsheet-format.

The satellites see the North and South Poles on each orbital revolution. The orbit planes revolve around the polar axis at the same speed as the Earth around the Sun, i.e. one revolution a year. Each orbital revolution transects the equatorial plane at fixed local solar times. Therefore, each satellite passes within visibility of any given transmitter at almost the same local time each day. The time taken to complete a revolution around the Earth is approximately 100 minutes.
At any given time, each satellite simultaneously "sees" all transmitters within an approximate 5000-kilometre diameter "footprint", or visibility circle. As the satellite proceeds in orbit, the visibility circle sweeps a 5000-kilometre swath around the Earth, covering both poles.
Due to the Earth's rotation, the swath shifts 25° west (2800 km at the Equator) around the polar axis at each revolution. This results in overlap between successive swaths. Since overlap increases with latitude, the number of daily passes over a transmitter also increases with latitude.

A new range of 'Angel' satellites are being implemented that will provide better coverage and replace some of the legacy platforms.

13. Appendix E – Argos to GPS Data Converter

Lotek Argos to GPS Data Converter Program.

13.1. Introduction

The data processor (converter) application is used to convert the GPS data downloaded from the Argos Web site into a format that can be used by the researcher. It is a general-purpose application that is used on several Lotek products. This is a Microsoft Windows only application (Version 7, 8.1 and 10) and has no special requirements.

The converter will convert the Lotek proprietary formats received via Argos into standard GPS locations, Altitude, Temperature, Battery voltage, positions, activity, and mortality information. The output position data contains the latitude, the longitude, the GMT time of the fix and a CRC status. The input data must be collected from Argos in the PRV/DS format.

The following setting in the Argos account is required:

256 bits	31 Sensors, 8 bit each, A2- Hexadecimal

For Argos-GPS applications, a location class account is not required, but if available, the converter will also extract the Argos locations. In case no Argos locations are available, only the GPS locations will be present. If other information is available in the Argos messages, these are also processed.

The Converter software can process data from multiple PinPoint tags including duplicates that are discarded in the conversion process. In addition, it can handle corrupted and chopped data, which can occasionally be present.

13.2. Software Installation

The application is an executable file that does not require installation. It is simply run from the folder it is located.

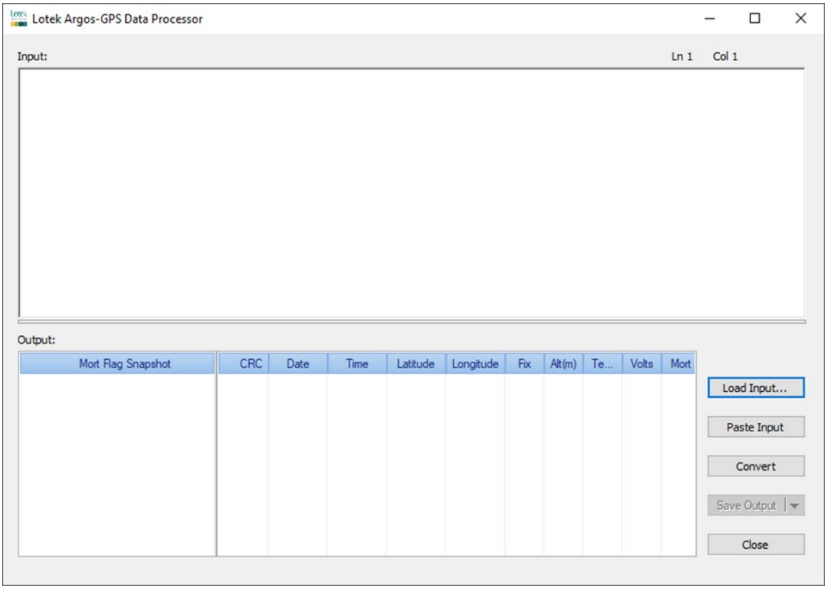
13.3. Converter Program Operation

Some of the functions the Converter program can do:

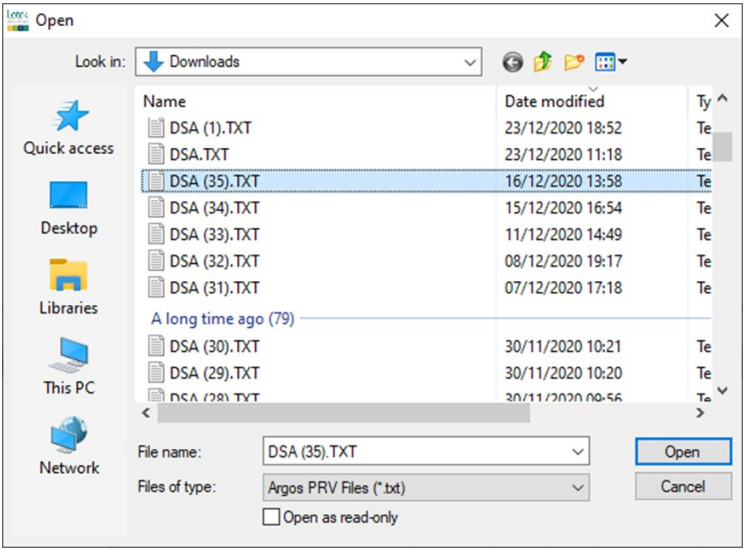
- Extracts the GPS positions (no height) and the time stamps from the raw Argos data in PRV/DS format;
- Extracts activity and mortality information (if present);
- Performs an error check on the GPS locations via CRC and marks the failed records as “FAIL”;
- Extracts the Argos positions (in case they are present) and the time stamps from the raw Argos data in PRV/DS format;
- Extracts the Argos positions (in case they are present) and the time stamps from the raw Argos data in .CSV file format;
- Eliminates duplicates;
- Arranges the data in chronological order;
- Creates separate individual files, in case data from more than one tag is present;

13.4. Using the Converter Program

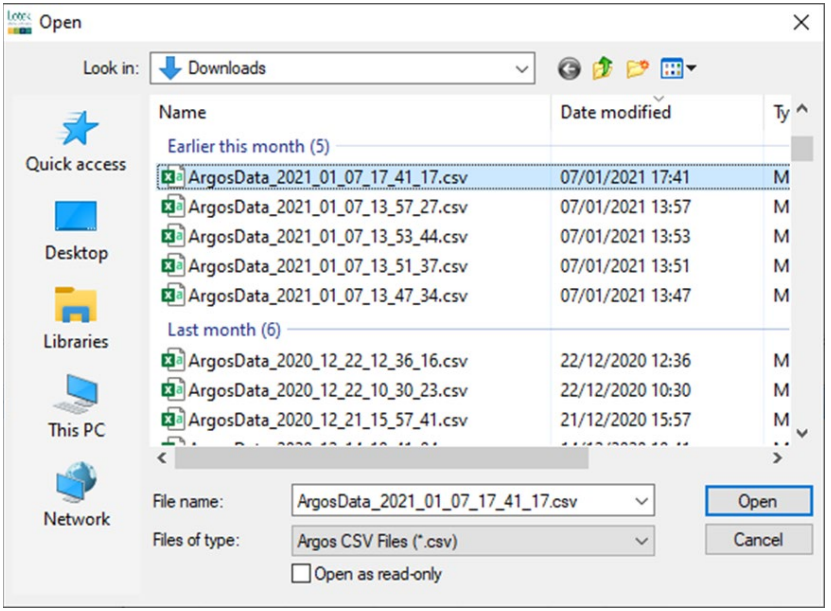
Start the application by clicking Lotek Argos-GPS Data Processor V4.xx.exe. the program will start and offer several options.



Load the data downloaded from Argos by using the 'Load Input' button and selecting the location of the file, a text file containing the Argos data collected in the PRV/DS format)


Open
Look in:
Downloads
Quick access
Desktop
Libraries
This PC
Network
Name
Date modified
DSA (1).TXT
23/12/2020 18:52
DSA.TXT
23/12/2020 11:18
DSA (35).TXT
16/12/2020 13:58
DSA (34).TXT
15/12/2020 16:54
DSA (33).TXT
11/12/2020 14:49
DSA (32).TXT
08/12/2020 19:17
DSA (31).TXT
07/12/2020 17:18
A long time ago (79)
DSA (30).TXT
30/11/2020 10:21
DSA (29).TXT
30/11/2020 10:20
File name:
DSA (35).TXT
Files of type:
Argos PRV Files (*.txt)
Open as read-only
Open
Cancel

Or a CSV file

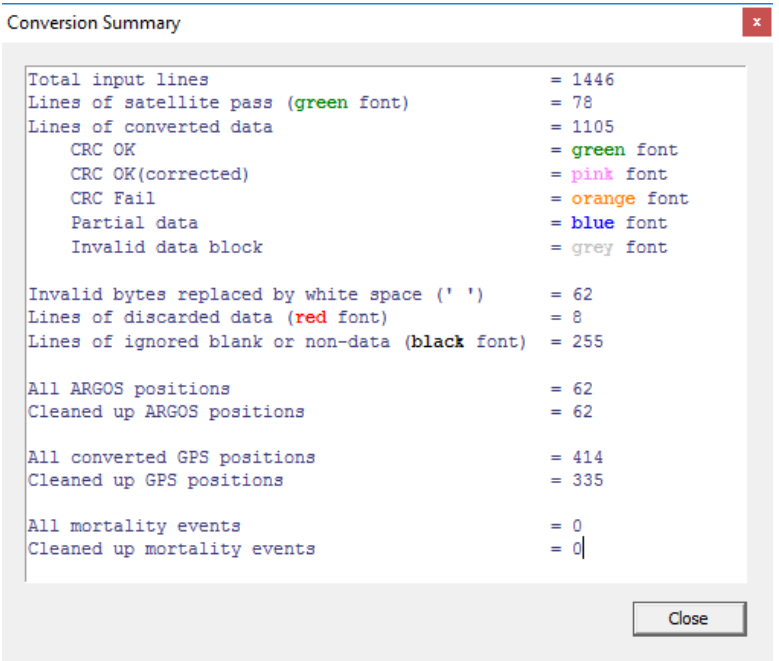

Open
Look in:
Downloads
Quick access
Desktop
Libraries
This PC
Network
Name
Date modified
Earlier this month (5)
ArgosData_2021_01_07_17_41_17.csv
07/01/2021 17:41
ArgosData_2021_01_07_13_57_27.csv
07/01/2021 13:57
ArgosData_2021_01_07_13_53_44.csv
07/01/2021 13:53
ArgosData_2021_01_07_13_51_37.csv
07/01/2021 13:51
ArgosData_2021_01_07_13_47_34.csv
07/01/2021 13:47
Last month (6)
ArgosData_2020_12_22_12_36_16.csv
22/12/2020 12:36
ArgosData_2020_12_22_10_30_23.csv
22/12/2020 10:30
ArgosData_2020_12_21_15_57_41.csv
21/12/2020 15:57
File name:
ArgosData_2021_01_07_17_41_17.csv
Files of type:
Argos CSV Files (*.csv)
Open as read-only
Open
Cancel

Data from several tags can be stored in the same file. The software can also handle multiple records present in the same file.

The Application offers several options that can be summarised below:

- 'Load Input' Selects and opens a raw data file (PRV/DS format) or CSV file.
- 'Paste Input' Pastes the content of the clipboard in the input window. It is also possible to edit and make changes via the input data editor.
- 'Convert' Reads and converts the input data, extracts GPS and Argos positions, along with activity and mortality data (if available). It sorts records by their Argos IDs, and removes the multiple records, to prevent the presence of identical records in the output data. It also checks the records and validates the ones which have a correct CRC. In case the CRC is incorrect, the record will be labelled as "FAIL".

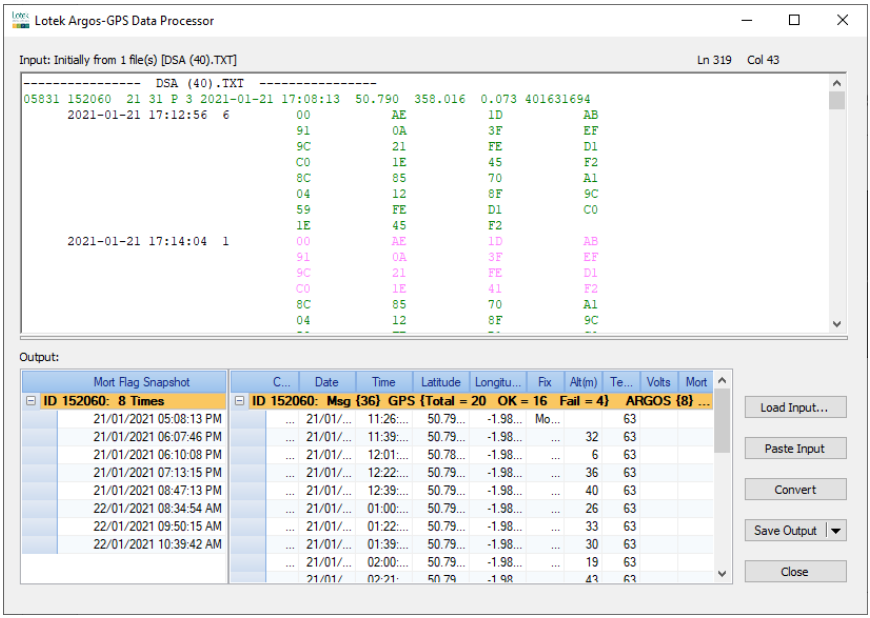
After the conversion, a summary report is displayed (see an example below):



The report contains diagnostic information, highlighted by colour, where errors have occurred and of what type. The number of converted GPS and Argos locations is also recorded, including any Activity or Mortality information if available.

Conversion results are displayed in the lower output windows. The number of Argos IDs, the number of locations, and the CRC status are also displayed. The input window will have the data marked (by using different colours, as described in the conversion summary (see the example below).

If the data downloaded is from a PinPoint Argos tag that support mortality, the additional data is available via the DSA.txt file. The example below a tag that supports mortality so this is shown in the separate Mortality Flag window.



The lower output windows contain the data corresponding to the different Argos IDs, along with some statistical information. The data is listed in the ascendant order of the Argos IDs. By selecting a certain Argos ID, the data for this specific ID will be displayed (the encapsulation approach is similar to the Windows Explorer). Mortality, temperature and voltage can also be seen in the lower output window (if supported by the tag).

By Selecting the 'Save Output' button, the program allows you to save the converted data to a number of different options.

- GPS location data only as a .csv file
- GPS Location data only as a .tag file (this file can be read and processed by Pinpoint Host).
- GPS and Argos location data as a .csv file
- GPS and Argos Location data as a .tag file (this file can be read and processed by Pinpoint Host).
- GPS location data only as a .txt file
- GPS and Argos location data as a .txt file
- Mortality Flag Snapshot will provide Mortality data as a .txt file.

If a Solar tag supports transmission of temperature and Battery voltage this can only be seen via the location file (GPS and Argos) saved as a .csv or .txt.

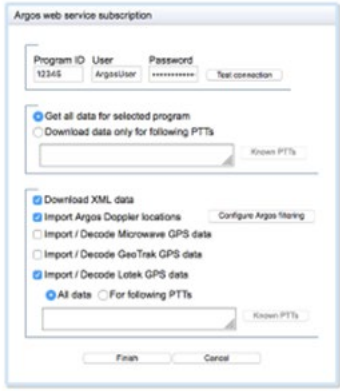
14. Appendix F – Movebank

Live data feeds for Lotek Tags

You can set up a subscription in Movebank to automatically import new data from your Lotek PinPoint tags several times per day. This service is free and you maintain full ownership and control of your data. See movebank.org/node/28 for detailed instructions.

Create a feed

- Register for a free account and log in at movebank.org.
- Go to *Tracking Data Map* > *Studies*, find your study or create a new one, and select *Manage Live Feeds* > *Argos*.
- Select *New* and choose an import channel (Web Service recommended).
- Enter your Argos credentials and check the connection.
- Select which PTTs to import.
- Check the box next to "Import/Decode Lotek GPS data", and optionally choose to import the Argos Doppler locations.
- Select *Finish*.
- After you have created a subscription, you can register to receive regular email notifications, including Google Earth files of recent locations. View the current status of data imports and make changes to the feed by selecting *Manage Live Feeds* > *Argos*.



Turkey vultures (Cathartes aura) 2003–2013
Bildstein et al. 2014, doi: 10.5441/001/1.46ft1k06

Why use Movebank?

Movebank offers a variety of tools to help you manage with and share your data. View your tracks on a map, run filters to flag outliers, and download data for use in other software programs. Flexible permissions options allow you to keep your data private, share them with collaborators, or make them available to the public. Other features include

- Define deployment periods and manage information about animals, tags, and deployments in the **Deployment Manager**.
- Annotate hundreds of environmental variables from global weather models and remote-sensing datasets to your tracking data using the **Env-DATA System**.
- Access your data from Movebank for analysis in R using the "move" package.
- Build your own websites, databases or analysis tools that access data from Movebank using our **API**.
- Formally publish datasets associated with peer-reviewed publications in the **Movebank Data Repository** and receive a DOI.

Movebank is coordinated and hosted by the Max Planck Institute for Ornithology.
For questions or feedback, contact us at support@movebank.org.

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