SEATRACK
Seabird Tracking

SEATRACK protocols for 2024

NEW !!!

New content for 2024 in the protocol is marked with this symbol – please read carefully!

List of protocols

NEW!!!

NEW!!!

These protocols are meant to serve as guidelines for field work carried out in cooperation with SEATRACK in 2024. Please distribute them as whole or in part to field teams as you see fit. If any questions arise, please contact Svenja.Neumann@npolar.no or Vegard.Brathen@nina.no

SEATRACK

This document should be read as a collection of protocols that covers all activities within the SEATRACK project. Some protocols are relevant for a few fieldworks, like deployments on Arctic terns or Leach's storm petrel, while other depends on the capacity and interest for each field team (e.g participation in Arctox or effect studies).

SEATRACK aims to map the non-breeding distribution of seabirds breeding in colonies that encircling the Labrador, Greenland, Barents, Norwegian, North and Irish Seas. It was first started in 2014 and has now been prolonged for a third period, lasting until the end of 2026.

This phase include three new additions. First, we include five species that are new to the project. Second, we aim for a large-scale deployment of leg-mounted GPS tags on species that weigh >900 g. Third, we introduce GPS-GSM instrumentation on large gulls. SEATRACK has also received extra funding for the next couple of years to map the wintering distribution of North-, Norwegian- and Baltic Sea breeding populations, which will include several new sites and partners.

This year we plan to deploy over 3000 GLS tags and 300 GPS tags distributed between 71 sites and 16 species.

At the end of the season we ask that all retrieved and unused loggers are returned to:

Norsk Polarinstitutt
Att: Svenja Neumann
Postboks 6606 Stakkevollan
N-9296 Tromsø
NORWAY

What loggers should be redeployed?

NEW !!!

- We recommend only redeploying GLS loggers of model mk3006 produced in 2022 and 2023, mk4083 produced in 2023. mk4083 and c330 produced in 2022 can be reused if necessary.

- See table below for serial number of loggers with enough battery to be redeployed.

Model	Logger ID and production year	
	2022	2023
mk3006	B7043 – B7968	B8324 – B9171
mk4083	C6834 – C8027	C8226 – C9526
c330	CE361 – CH078	/
c65_super	CE561 – CE620 CF045 – CF899 CG626 – CG675	CF212 – CF231 CL410 – CL808

- GPS loggers produced in 2023 can be redeployed, if **recharged** and **firmware replaced** according to protocol.

Remember to note and keep track of start times. Note clearly time zone, preferably GMT.

Please use the "RESTART TIMES sheet" in the metadata template.

SEATRACK 2024

Important notes

- IMPORTANT – Migrate Technology users
  Please update your IntigeoIF software to the latest version (IntigeoIF 1.15.0) following the links below.
- the delay of start functionality is not compatible with recording modes 7, 8 or 9 in previous versions of IntigeoIF software, which allows this combination but must not be used.
  - Note that all loggers sent to SEATRACK participants have been started beforehand, so this only applies if you are restarting the logger.

All relevant software can be downloaded following these links:

- **For Migrate Technology**

IntigeoIF interface software 1.15.0: Please contact info@migratetech.co.uk for the latest version of the software.

- **Lotek (formerly Biotrack (and BAStrack))**

The latest version (V19): Please contact info.uk@lotek.com for the latest version of the software.

SEATRACK 2024

GLS models

mk3006 (Lotek (Biotrack)) 16x14x6 mm, 2.5 g, 3-5 years

Light - Maximum value recorded every 10 minutes.
Wet/dry - State obtained every 3 sec, recorded in 10 minute bins (0:200).
SST - Recorded after 20 min continously wet and thereafter with 20 min intervals until dry > 3 sec.
Variant mk3005 records the exact time (within 3secs) a state change occurs; but new state is recorded only if it is sensed for 6 secs or more. SST is recorded after 25mins continuous wet, repeated every 24.8 hours but timer will reset anytime device goes dry for >6secs.

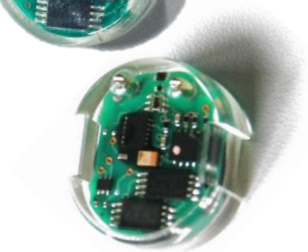
mk4083 (Lotek (Biotrack)) 17x10x6,5 mm, 1.9 g, 3 years

Light - Maximum value recorded every 10 minutes.
Wet/dry - State obtained every 3 sec, recorded in 10 minute bins (0:200).
Does not record SST

Several different logging modes are available for Migratetech loggers. The values displayed correspond to "mode 6", most used by SEATRACK.

c250 17x18x6 mm, 2.6 g, 5 years

Light - Clipped range, sampled every minute, max value recorded every 5 minutes.
Wet/dry – State obtained every 30 sec. Recorded in 10 min bins (0:20)
SST – Measured continuously after 20 minutes submersion, max, min and mean recorded every 4 hours.
Limitations – Memory 60 months, Battery 84 months.



c330 17x19x8 mm, 3.4 g, 4 years

Same programming as the C250 but in addition to thicker epoxy shell it offers the option of delaying start of recording.
Limitations – Memory 52 months, Battery 52 months.

c65/w65 14x8x6 mm, 1.0 g, 1-2 years

Light - Clipped range, sampled every minute, max value recorded every 5 minutes.
Wet/dry – State obtained every 30 sec. Recorded in 10 min bins (0:20)
SST – Temperature is not recorded in mode 6 but values obtained in other modes are not considered reliable enough , by the producer, for SST.
Limitations – Memory 28 months, Battery 23 months.

f100 and c65_super 14x8x6 mm, 1.0 g, 1-2 years

Light - Clipped range, sampled every minute, max value recorded every 5 minutes.
Wet/dry – State obtained every 30 sec. Recorded in 10 min bins (0:20)
SST – Measured continuously after 20 minutes submersion, max, min and mean recorded every 8 hours.
Limitations – Memory 26 months, Battery 23 months.
An option for delayed start of recording will be used for F100's intended to be deployed in colonies above 70°N latitude due to the midnight sun.

w30A9 15x5x4 mm, 0.45 g, 1 year

Light - Clipped range, sampled every minute, max value recorded every 5 minutes.
Wet/dry – State obtained every 30 sec. Recorded in 10 min bins (0:20)
Limitations – Memory 12 months, Battery 12 months.

SEATRACK 2024

GPS models

NEW !!!

2024 GPS model

NanoFix GEO GPS logger for species weighing over 900 grams

- 27 x 20 x 9 mm for the main housing plus ~25 mm of external antenna protruding, 3.5 - 4.0 g , 1 year
- Duraform protective frame and epoxy
- Wet/dry: reading every 60s
- Accelerometer: provide 60s burst of 25Hz 3-dimensional data with each GPS location attempt
- Attempt to achieve one positional fix per day
- Rechargeable
- **Limitations** – Memory 12 months, Battery 12 months.

Loggers are intended for:

surface feeders:

- Glaucous gull
- Herring gull
- Northern fulmar
- Great skua

diving species:

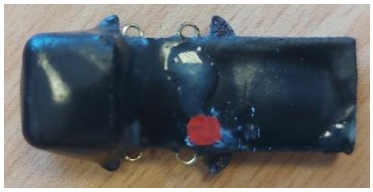
- European shag
- Brünnich's guillemot
- Common guillemot
- Northern gannet

SEATRACK 2024

GPS models

2023 GPS model

1. Surface feeders (GLGU, HEGU, NOFU, GRSK)



- 38 x 13 x 5 mm, 3 g or less, 1 year the domed section height being ~9 mm
- Casing + epoxy coating
- Wet/dry: yes
- Attempt to achieve one positional fix per day
- Rechargeable
- **Limitations** – Memory 12 months, Battery 12 months.

2. Diving species I (EUSH, BRGU, COGU, NOGA)

- 35 x 12 x 5 mm, 3 g or less, 1 year
- Epoxy coating only
- Wet/dry: yes
- Attempt to achieve one positional fix per day
- Rechargeable
- **Limitations** – Memory 12 months, Battery 12 months

GLS-logger deployment

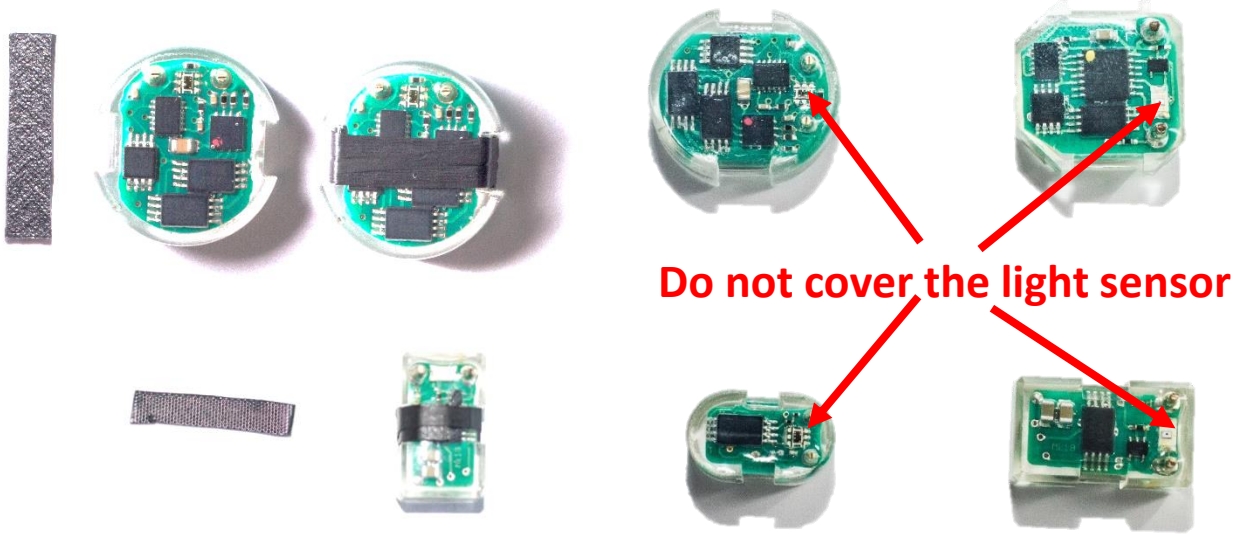
Keep in mind...

- The geolocator is purely archival; you must recover the instrument in order to get the data. Therefore logger deployment should be limited to breeding birds which can be trapped again at the same location in another year.
- Vulcanizing (amalgating) tape increases friction keeping the logger and cable tie in place.
- Vulcanizing tape is very elastic and therefore it is enough to use a small piece cut of the end of the tape roll. Wrap it tightly around the logger where the cable tie will sit. This can be done in advance, i.e. in camp before heading out trapping and **we advise you to do so** to minimize handling-time.
- Loggers **<u>should not</u>** be mounted on rings beforehand, unless the ring overlap is only partial (x 1.2). **<u>Do not do this with doubly wrapped rings whether they are drilled or not.</u>**

Partially overlapped (x 1.2) ring.
Logger can be mounted beforehand

Fully overlapped/doubly wrapped (x 2.2) ring.
*Logger should **<u>NOT</u>** be mounted beforehand*

- BE VERY CAREFUL NOT TO COVER THE LIGHT SENSOR!
  It is essential that you do not cover the light sensor when attaching the logger to the bird! Otherwise the data will be useless.



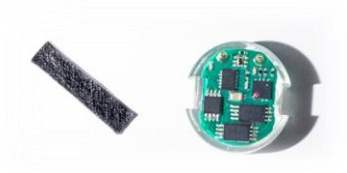
Equipment needed for GLS deployment

At the start of this year's season all participants will be or have been provided with:

- Loggers
- Interface boxes
  - All loggers sent to participants in the project have already been started.
  - Please contact project-staff if you are missing interface boxes needed for downloading data from either Migratetech or Biotrack loggers.
- Colour rings / Logger mounts
- Cable ties
  - 1.8 mm thick for C65 being deployed on Little Auks
  - 2.3 mm thick for all other deployments
- Cable tie-pistol
  - For strapping cable ties and snipping loose cable tie-ends
  - Super glue
  - A drop of superglue should be placed in the cable tie lock after the lose cable tie end has been cut off.
- Vulcanizing tape
- If participating in ARCTOX sampling bags, syringes, and vials will be provided by Jerome Fort by agreement.

- In addition, all teams should be equipped with:
  - Ringing pliers and circlip pliers
  - Metal rings
  - Wing ruler
  - Calipers
  - Spring balance/scales
  - Bird bags
  - Note book and pens

Mounting of mk3006 & c330

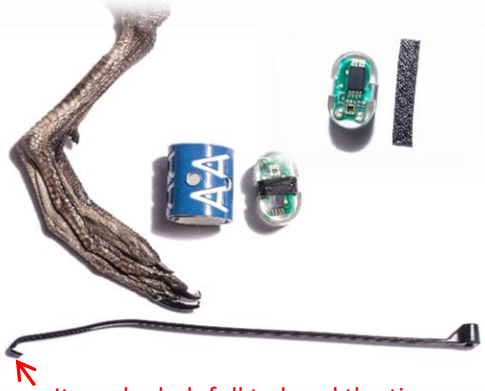


1. Remember to wrap the logger groove (where the cableties will sit) with vulcanizing tape. DO NOT COVER THE LIGHT SENSOR.
2. Place the ring on the bird's tarsus
3. Thread two 2,3 mm wide cable ties through the ring, one from each side.
4. Loop the cable ties but do not tighen them too much.
5. Place logger inside the cable tie loops and tighten with pliers and/or cable tie strapper. It is important that the terminals (golden pins) should always face outwards, away from the birds leg.
6. Make sure that when you tighten the ties, that the locks fall within the groove and over the opposit cabletie.
7. Cut the lose cabletie-ends off by the lock and put a drop of superglue inside the lock.
8. Make sure that light sensor is not covered and everything is tight and ok, if so release the bird.

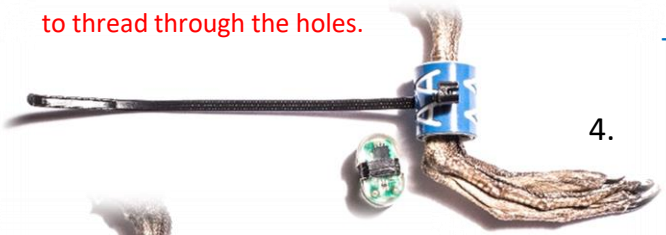
1.) Note that the cable ties must be threaded one from each side, i.e. not the same way.
2.) Do not tighten the cableties fully until you have positioned both ties in the groove of the logger so the locks' edges clamp down on the opposite tie.

Note correct position of cabletie locks

Mounting of mk4083 & c65_super



It can be helpfull to bend the tip of the cable tie to make it easier to thread through the holes.



1. Remember to wrap the logger groove (where the cableties will sit) with self amalgamating tape. DO NOT COVER THE LIGHT SENSOR.
2. Place the ring on the bird's tarsus
3. Thread a single cable tie through the pre-drilled holes in the ring. Note that it can be stiff and tight but it still should fit.
   - Use 1.8 mm wide cableties only for deploying loggers on Little auks
   - Use 2.3 mm wide cableties for all other deployments
4. Place logger (with Vulc. tape) inside the cable tie loop and tighten with pliers and/or cable tie strapper. It is important that the terminals (golden pins) should always face outwards, away from the birds leg. When mounting the smaller loggers, the terminals should be on the lower half of the logger relative to the birds leg.
5. Cut the lose cabletie-end off by the lock and put a drop of superglue inside the lock.
6. Check that light sensor is not covered and everything is tight and ok, if so release the bird.

Note that in some cases loggers can be attached to smaller logger-mounts that can be placed above the metal-ring. Note though that the logger-mount should in no way be attached to the metal ring.

Mounting on Arctic tern (ARTE) and Leach's storm petrel (LSP)

GLUE and ring material

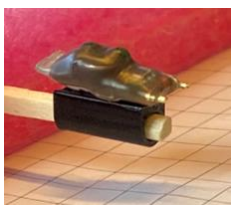
3D-printed nylon plastic rings for LSP (left) and PVC plastic rings for ARTE (right)

1. The plastic materials used to produce the rings supplied for ARTE (PVC) and LSP (3D printed nylon plastic) do NOT attach well to the standard Loctite super glue we supply for the other rings/species.
2. Instead you should use Loctite super glue ALL PLASTICS which is supplied by us together with the loggers and the rings.
3. https://www.loctite-consumer.co.uk/en/products/super-glue-liquid/super_glue_all_plastics.html
4. It consists of an activator pen which you apply first and an all plastics super glue which you apply after 60 sec.
5. Practise application of glue before going in the field
6. Note that the black cap may easily get stuck to the transparent base of the top. If so, try to use two plyers to reopen.
7. Also, bring a spare tube in the field.

Loggers

1. Integeo--W30A9-SEA by Migrate Technology for ARTE and LSP.
2. 15 x 5 x 4 mm, 0.45 gram
3. 12 month battery. We started them (with a delay) just before sending them to you- to maximize the battery life for the deployment period.

Cable ties or glue only



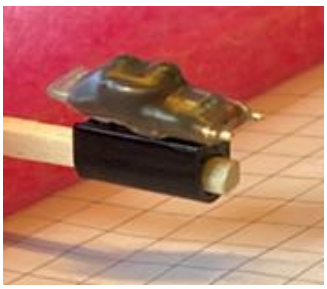
1. We use **1.6 mm** wide cable tie for ARTE (left)
2. We use only glue (all plastic) for LSP (right)

Mounting on Leach's storm petrel (LSP)

NEW !!!

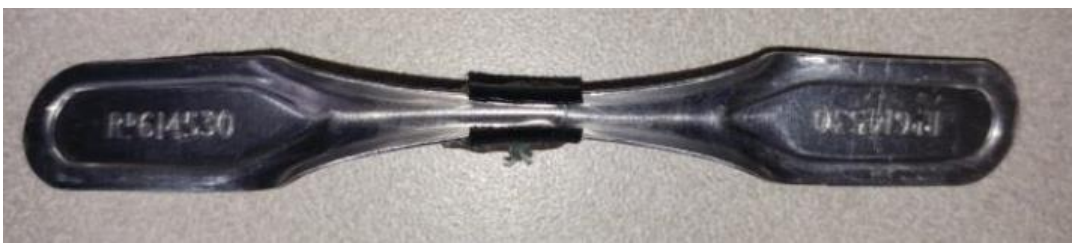
Mounting on leg [pre-mounted loggers]

1. The logger comes pre-mounted on the 3D-printed ring, attached with glue only. Hence, loggers are already well glued and attached to the ring.



NOTE:
LOGGER-ID is written on the plastic bag.

2. Mount it on the leg (tarsus) with gold pins pointed up to avoid damage to foot webbing of the LSP.
3. Open the ring by using two applicators (same as passerine banders use to put color bands). Remove the applicators to close the ring around the tarsus.



4. Glue: Apply the activator pen on both sides of the slit before or after closing the ring. After closing the ring and 60 sec after the activator pen, apply the all plastic super glue along the slit.
5. Tape: Add a thin line of Tesa tape over the slit (lower right picture). Let the glue soak into the tape. Note: You need to get the tape yourself. Tesa-4671-25-mm. (white, 25 mm) www.rufo.no/products/tesa-4671-25-mm

Slit

Thin line of Tesa tape over the slit .

Photos/method credit: April Hedd, Dave Fifield, Børge Moe.

Mounting on Arctic tern (ARTE)

Mounting on leg [pre-mounted loggers]

1. Loggers pre-mounted on the PVC ring attached with 1.6 mm cable tie. Already well glued to the ring.

2. Mount it on the leg (tarsus) with gold pins pointed down to have light sensor away from body (we don't think potential damage to foot webbing is an issue here).

3. Use your fingers and nails to open the ring and wrap/work it around the leg.

Note: The plier tooth is meant to represent the leg and not a method to open the ring

NOTE:
LOGGER-ID is written on the plastic bag.

4. Activator: Apply the activator pen along the opening of the ring
5. 60 sec after the activator, apply the all plastic super glue.

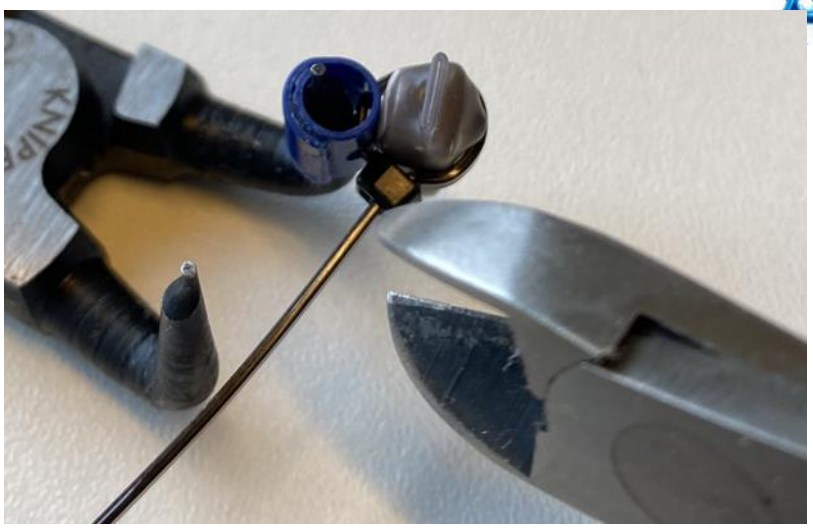
2 examples of logger on PVC ring on ARTE tarsus.

Note: The plier teeth are meant to represent the legs and not a method to open the rings

Mounting on Arctic tern (ARTE)

Mounting on leg

1. Loggers not pre-mounted on the PVC ring



2. Ring: Use your fingers and nails to open the ring and wrap/work it around the leg (left picture)
3. Thread the 1.6mm cable tie through the holes.
4. Activator: Apply activator inside the overlap of the ring.
5. GLUE: Apply all plastic super glue inside the overlap of the ring to firmly close the ring.
6. Activator: Apply activator on back of the logger and on the ring surface
7. GLUE: Apply all plastic super glue on the back of the logger
8. Tigthen the cable tie carefully around the logger with the cable tie pistol- but DO NOT AIM to use the pistol to CUT because this cabel tie may easily break.
9. Cut the cable tie with another cutter (rigth picture)
10. GLUE: Apply all plastic super glue between the logger and the ring
11. GLUE: Apply all plastic super glue around the cable tie (do not cover the light sensor)

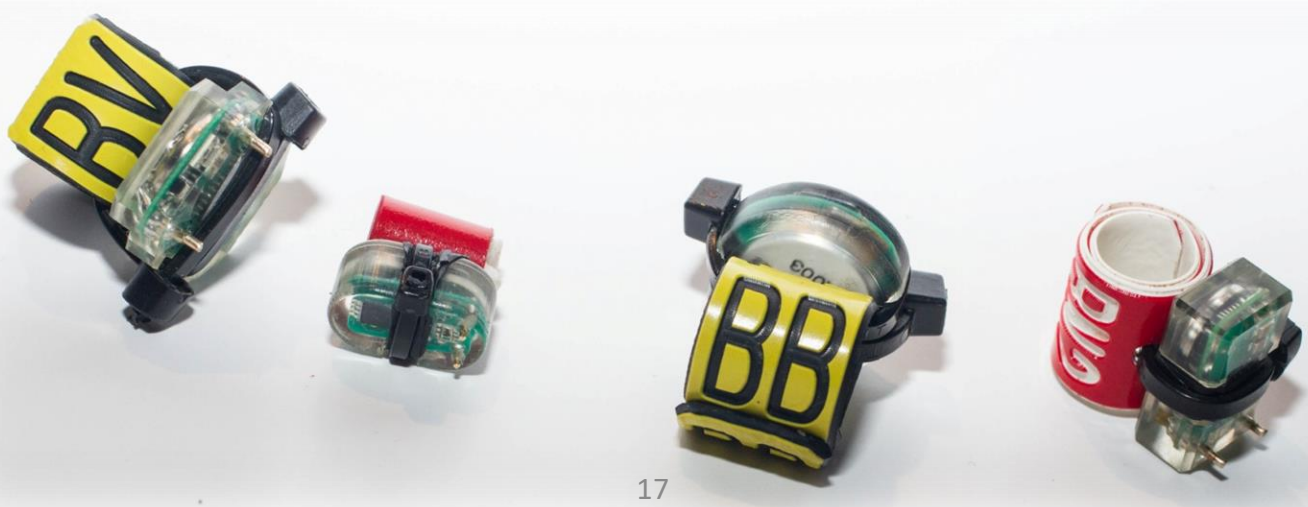
Retrieval

- At retrieval remove the logger from the plastic ring and if you are so inclined, replace it with a new logger.
- Preferably take all measurements requested, but at the least weigh the bird and note down the bird's breeding status.
- Take feather samples (see sampling protocol – additional feather samples and blood if sampling for ARCTOX)
- If you do download the files directly, please send a copy to Vegard.Brathen@nina.no or Svenja.Neumann@npolar.no

Whether you do so or not, all GLS-loggers, other than those redeployed, should be sent to:

Norsk Polarinstitutt
Att: Svenja Neumann
Postboks 6606 Stakkevollan
N-9296 Tromsø
NORWAY

- Regardless of the data having been downloaded or not. If you have attempted to download before sending the loggers to Tromsø, please include a list of which loggers were successfully downloaded and which ones gave an error message. For this purpose, a template can be found this year as a separate sheet in the METADATA-file that is distributed to each participant!



Downloading GLS-loggers

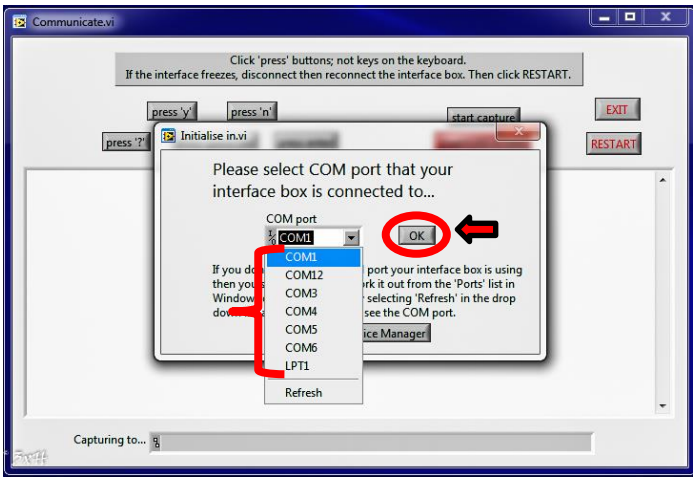
- ***NB! The only loggers that SEATRACK requires to be downloaded during the field season are loggers intended for redeployment. However, all loggers should preferably be downloaded by participants on retrieval, if possible, and the files sent to Svenja.Neumann@npolar.no . The sooner the logger is downloaded, the better. If you are not able to download yourself, SEATRACK staff will do it for you. All loggers should be sent to Tromsø at the end of the field season, where we are able to attempt a second download if anything went wrong the first time.***
- If you are able to download the data, we urge you to do so but be very careful **not** to wipe the memory, unless you have a logger intended for redeployment.
- Wiping the memory happens at different stages in the downloading process varying between producers:
- **Lotek (Biotrack)** loggers wipe the memory when they are turned off/sent to sleep mode,
- If you do not intend to redeploy the logger – be sure to select **NO** when presented with the last question in the downloading process in "Communicate.exe" after downloading data from, MK3005, MK3006, MK4083 and/or MK4093 (*see page 16*).
- **Migrate technology** loggers need to be turned off to be downloaded, the memory is wiped when they are started again. So, if you download or attempt to download data from C330, C250, F100 or C65-super loggers please be sure **NOT** to switch them on again after doing so but to send them to Tromsø.
- It is very important that you make sure that you have the latest versions of the softwares from Lotek (Biotrack) and Migrate Technology (page 4).

Downloading Lotek GLS-loggers

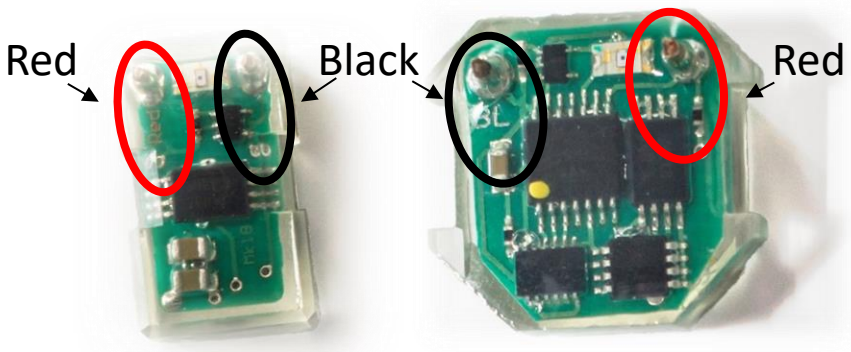
In this section the download procedures for GLS loggers produced by Lotek (formerly Biotrack; mk4093, mk4083, mk3005 and mk3006) are described. Data can also be downloaded by SEATRACK staff. If you download the data yourself, please send a copy of the .txt files.

The step by step downloading procedures are as follows:

1. Plug the interface box in to a USB communication port (COM port) of a computer on which the software has been installed.
2. Select and open “Communicate.exe”
3. Select the COM-port to which the interface box is connected, it is often the highest numbered port on the list. If you are having problems finding the correct COM-port you can find it via Windows Device Manager (Start -> Control Panel -> System -> Hardware -> Device Manager -> Ports for XP); most likely under ‘USB Serial Port’. Some trial and error may be needed at first.

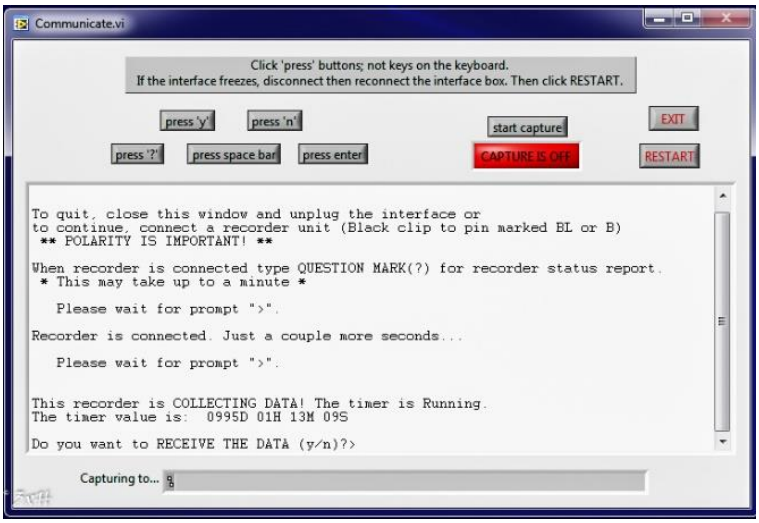


4. When you have the dialog window up and running, connect the red and black clips to the golden pins on the logger. **Polarity is important** and on the logger, by either pin, you should see markings; “BL”, “Black”, “R” or “Red”, telling you which clip should go where. Reversing the clips will not damage the logger in any way, it will result in an error-message and you won’t be able to download the data until you connect it again correctly. **The interface does not allow for using the keyboard** so be aware you will always need to click the buttons with your mouse. **Use the mouse cursor to select the button marked “press “?””**.



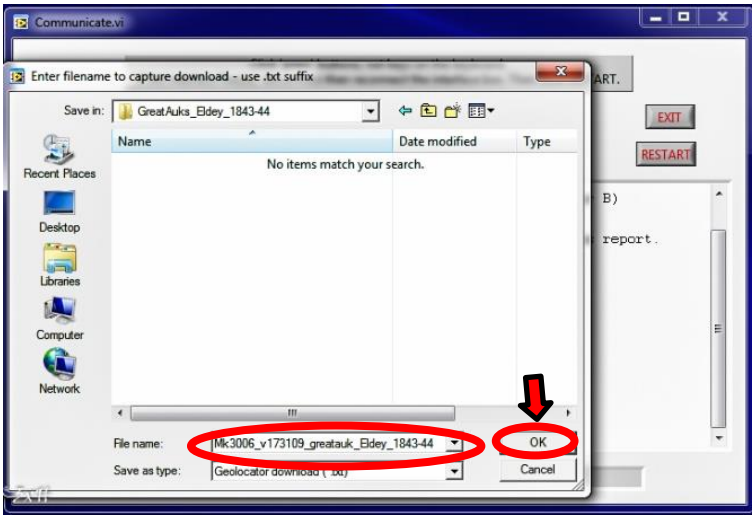
Downloading Lotek GLS-loggers

5. When you have connected the logger correctly and pressed the “press “?”” button the interface will connect with the logger and show the logging status, e.g., ”logger is connected” and if everything is working as it should be: “This recorder is COLLECTING DATA! The timer is Running. The timer value is: XXXXD XXH XXM XXS”.



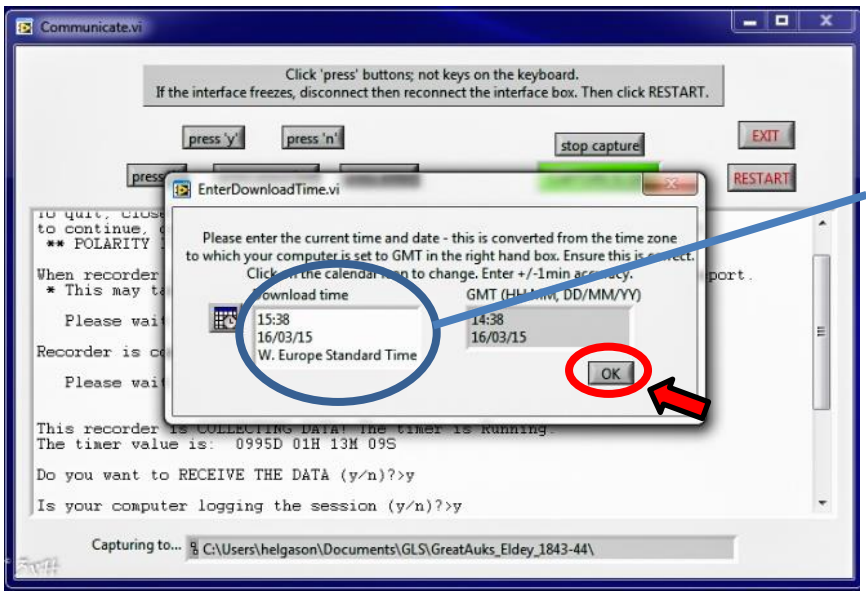
6. You will then be asked if you want to “RECEIVE THE DATA (y/n)?”. Press the “Press “y”” button in the interface with your mouse cursor.

7. Now a window will pop up asking you to specify what you want to name the file you are about to download and where you would like to save it. SEATRACK participants are free to use their own naming conventions as long as the name includes the loggerID but **we recommend using loggerID, year downloaded and model, e.g., “V182226_2019_mk3006.txt”** for a mk3006 logger retrieved and downloaded in 2019. When you have entered a name and a location to save the file in, press OK.



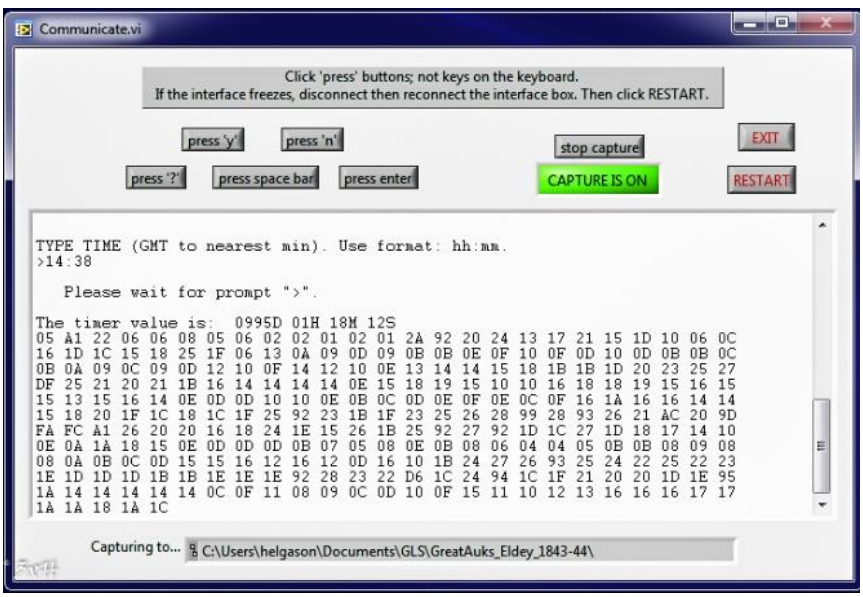
Downloading Lotek GLS-loggers

8. Next you will be asked to enter, or more likely confirm, the download time. The time is adjusted to the time zone your computer is set to in the left hand display but GMT on the right. If the time is ok select “OK” if not adjust the time but be aware to use the same format, and then click “OK”. (NOTE if backspace is used the timer value in the .txt file must be adjusted.



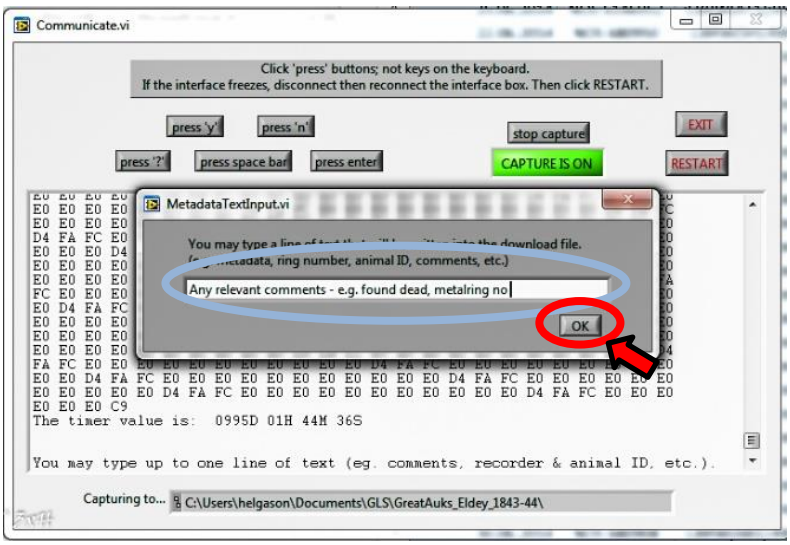
Make sure that date and time are correct according to GMT. Be sure that you have an accurate clock for comparison.

9. Now downloading commences, first the timer value will appear again and then a long sequence of numbers and letters. This might take several minutes, the more data the longer the download will take.

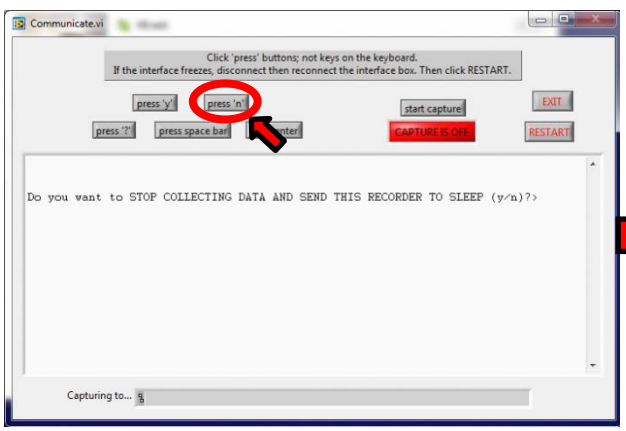


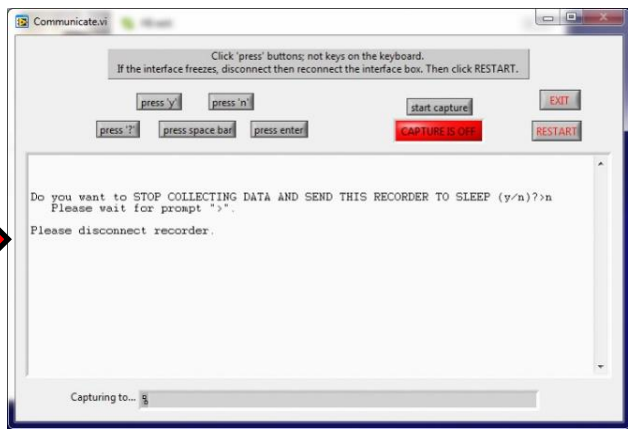
Downloading Lotek GLS-loggers

10. When the data is downloaded a “MetadataTextInput.vi” window will pop up where you can enter any relevant comments. However this is not necessary and all info entered into this window should also be entered into the metadata-file. Press “OK”



11. Now you are asked in the interface: “Do you want to STOP COLLECTING DATA AND SEND THIS RECORDER TO SLEEP (y/n)?” If you do NOT intend to redeploy the logger **it is very important that you press the “press “no”” button on the interface**. By sending a Biotrack logger to sleep you effectively erase its memory, do **NOT** do that **UNLESS** you intend to restart the logger for redeployment! If you select “Press “yes”” by accident there is a fail-safe, you will be asked if you are sure and then, **be sure to select “Press “No””!**





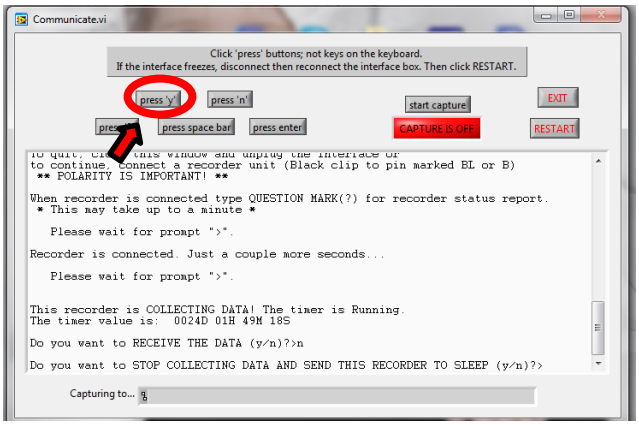
- After selecting **“Press “No””** you are asked to disconnect the logger, do so and the procedure is over, you can either shut the program down or start the process again to download another logger.
- **If you intend to restart the logger and redeploy it see the following page.**

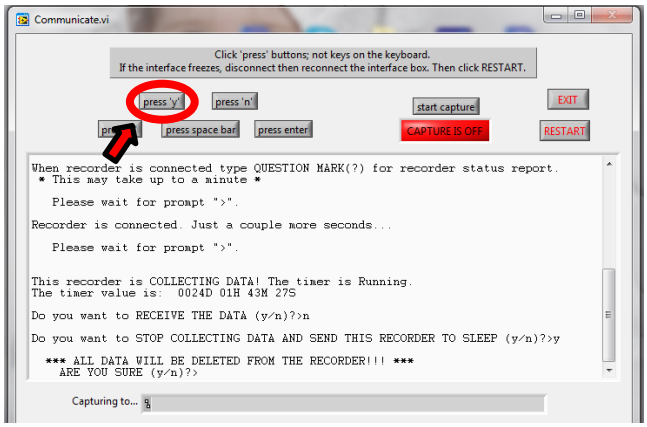
Restarting Lotek GLS-loggers

(Only loggers that are intended for redelpoyment)

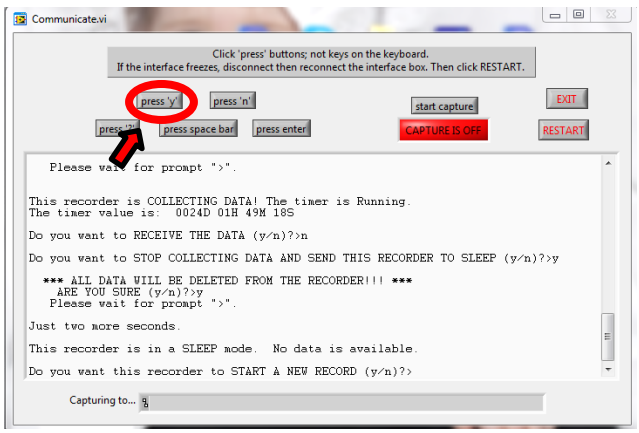
1. Set the logger to sleep mode*. If you have just downloaded the logger and have been presented with the window asking: ““Do you want to STOP COLLECTING DATA AND SEND THIS RECORDER TO SLEEP (y/n)?”, press the “press “y”” button on the interface. You will be asked if you are sure and informed that the memory will be erased. Select yes.

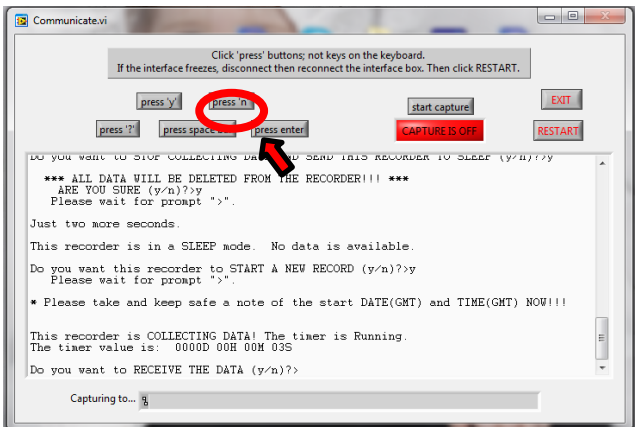
   **If you have safely downloaded the data in an earlier session simply connect the logger with the interface-box, select “press”?”” and wait for the prompt and “press “no”” when asked if you want to download the data. You will subsequently be asked if you want to put the logger to sleep.*





2. Now you will be informed that the logger is in SLEEP mode and No data is available. You are then asked: Do you want the recorder to START A NEW RECORD?”, select “Press “yes””. You are then prompted with the message: “* Please take and keep safe a note of the start DATE(GMT) and TIME(GMT) NOW!!!”. Pease DO SO and make sure beforehand that you have an accurate clock, preferably an online one, for comparison. **Note the start date and time (GMT) down in the METADATA-spread sheet (dedicated sheet added to METADATA)!**





3. Now you will be informed that : ”This recorder is COLLECTING DATA! The timer is Running. The timer value is: 0000D 00H 00M 03S”. Subsequently you are asked if you want to RECEIVE THE DATA?, select “Press”no”” and finally you are asked if you want to STOP COLLECTING DATA AND SEND THIS RECORDER TO SLEEP? Select “Press”no””, wait for the prompt and disconnect recorder. It is ready for another deployment session.

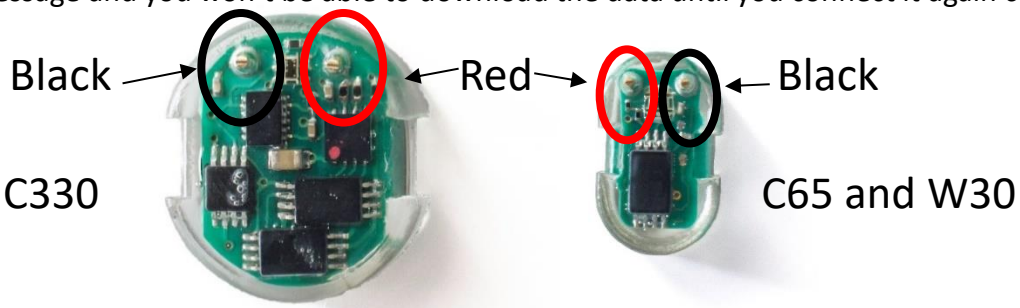
Downloading Migrate Technology GLS-loggers

In this section the download procedures for GLS loggers produced by Migrate Technologies Ltd., F100, C65, W65, C330 and C250. Due to the limited battery-life left in most retrieved Migratetech loggers (F100, W65, C65, C250), most loggers cannot be redeployed, except the C330. As with the Biotrack loggers it is up to the participants themselves if they wish to download the data for themselves. If you decide to do so we request a copy of the downloaded files and afterwards all retrieved loggers, downloaded or not should be sent to Tromsø at the end of the field season.

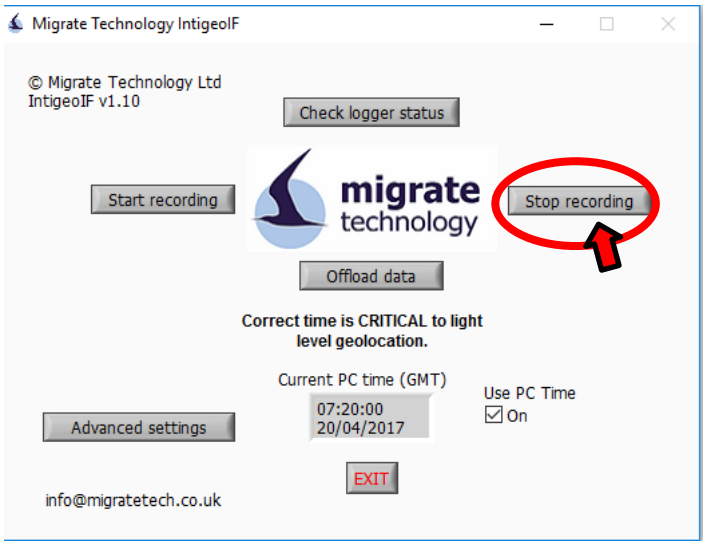
It is important to use version v1.10.0 of IntigeoIF. Please contact info@migratetech.co.uk **for the latest version of the software.**

The step by step downloading procedures are as follows:

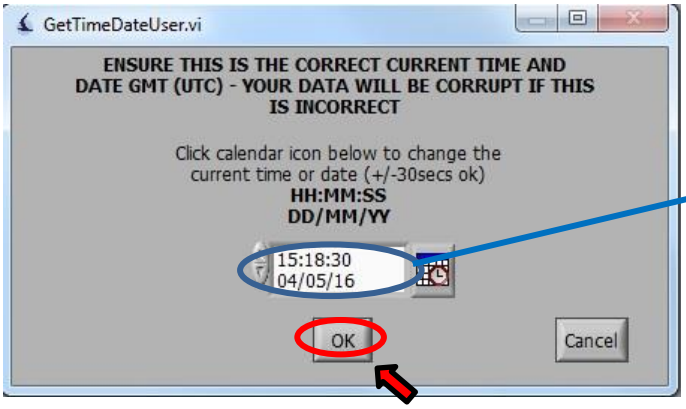
1. Plug the Migratetech interface box in to a USB communication port (COM port) of a computer on which the latest Migratetech software has been installed.
2. Select and open "IntigeoIF.exe"
3. When you have the dialog window up and running, connect the red and black clips to the golden pins on the logger. **Polarity is important**, the figure below shows which clip should go where. Reversing the clips will not damage the logger in any way, it will result in an error-message and you won't be able to download the data until you connect it again correctly.



4. **Note the difference in the procedures for Biotrack and Migratetech that to be able to download data from Migratetech loggers they must be turned off. Unlike the Biotrack loggers the memory is not erased when the logger is turned off but when it is restarted.** So when you have connected the logger to the interface select "**Stop recording**". You will then be presented with a series of windows:

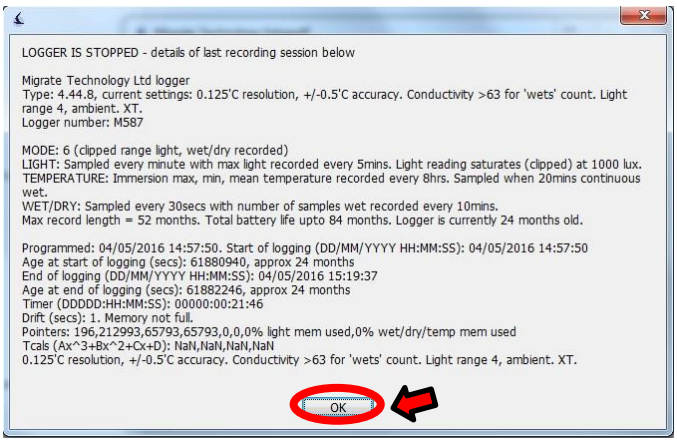


Downloading Migrate Technology GLS-loggers

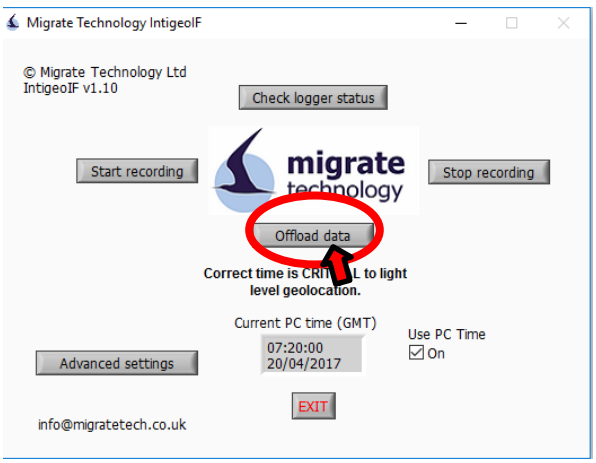


Make sure that date and time are correct according to GMT. Be sure that you have an accurate clock for comparison.

5. When presented with a window asking you to confirm/correct the clock, make sure that the time and date are correct and make note of the stop time. **Use GMT and be sure that you have an accurate clock for comparison.**

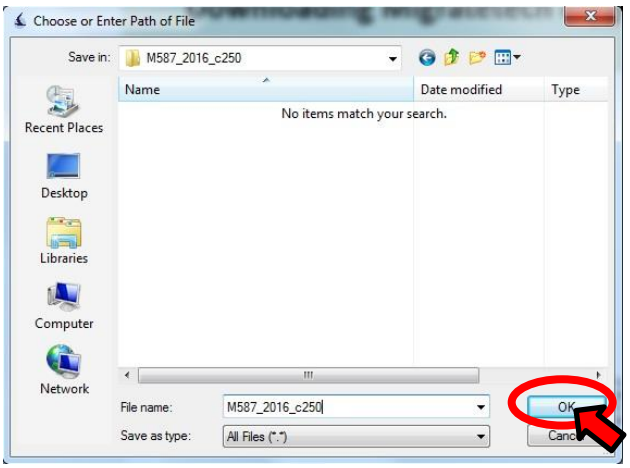


6. Next you will presented with a window summarizing the stats of last log. Select ”OK”, that will bring you back to the main interface module.

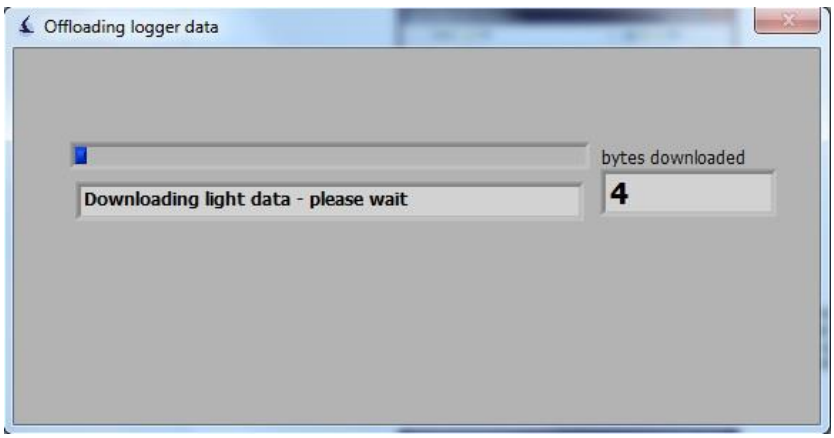


7. When you have securely turned the logger off, select “Offload data”, to start the downloading process.

Downloading Migrate Technology GLS-loggers

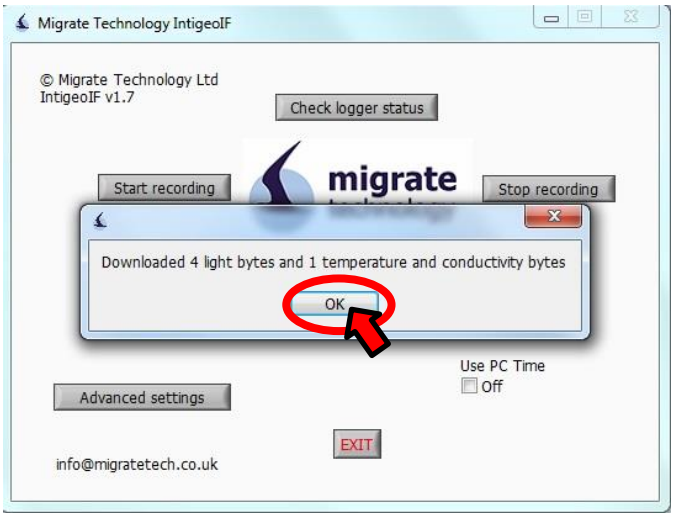


8. Then the program will ask where you want to save the downloaded files and under what name. The program suggests a name, based on the logger ID and download date and time. **We recommend you use that or the SEATRACK convention i.e. loggerID, year downloaded and model, e.g., "R133_2019_c250.txt"** for a c250 logger retrieved and downloaded in 2019. Since the downloaded data is written to 7 different files we recommend you create a folder to contain all files from each individual logger.

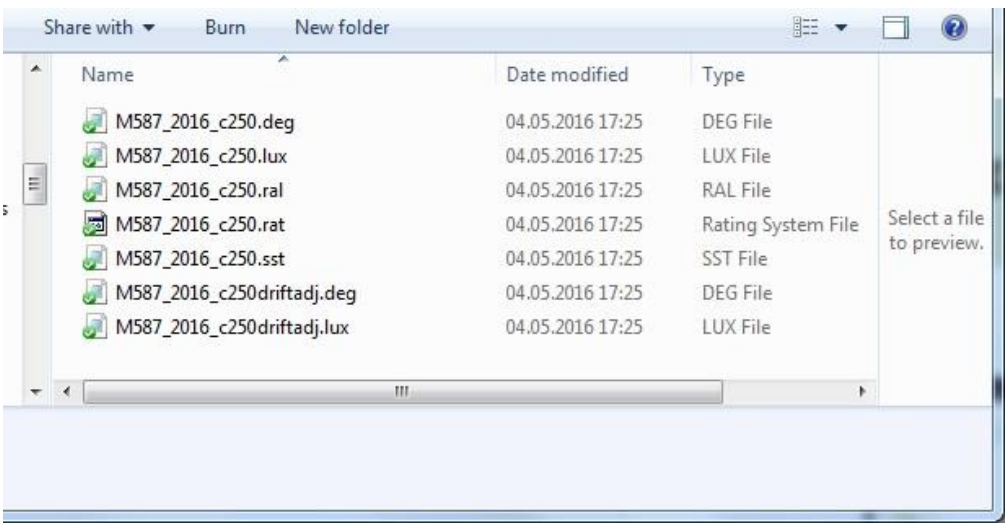


9. When you have selected where you want to save the files, the download commences. This process is much quicker than with the Biotrack loggers but also varies with how long the logger has been recording and in what mode.

Downloading Migrate Technology GLS-loggers



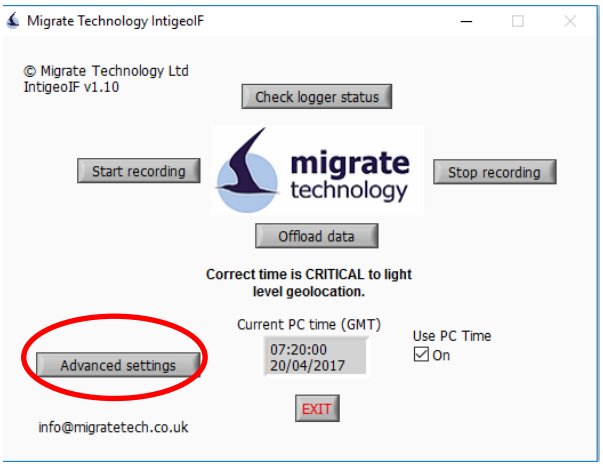
10. When the download is finished you will be prompted with a summary window, select ok and the process is over, the download is complete. If you are redeploying a Migratech logger, please make sure that all files have been downloaded before you start the logger up again.



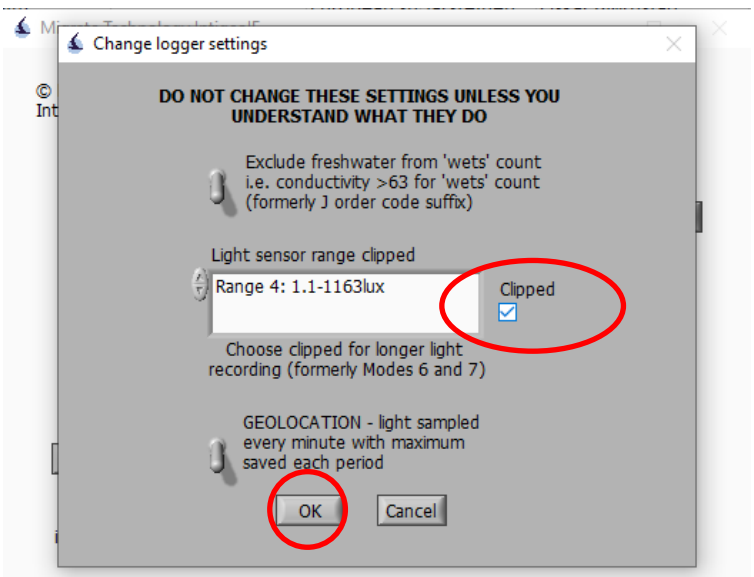
11. From each logger you should receive 7 different files, *.deg, *.lux, *.ral, *.rat, *.sst, *driftadj.deg and *driftadj.lux. **Afterwards, please ZIP the folder containing all the files and send it to Vegard.Brathen@nina.no or Svenja.Neumann@npolar.no**

Start-up/restarting Migrate Technology GLS-loggers

- ***NB! only after you are sure you have successfully downloaded the data from previous deployment.***



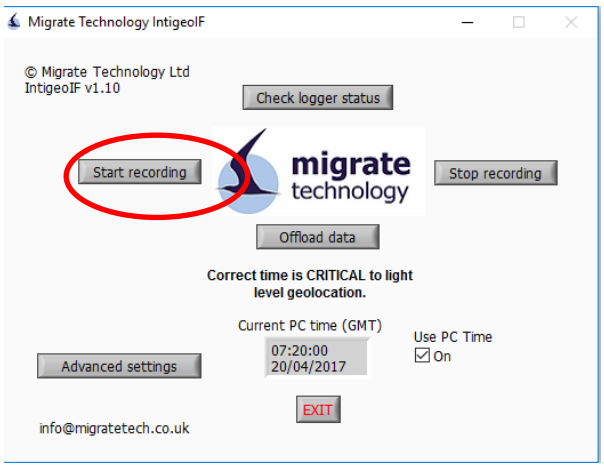
1. In the main module select “Advanced settings”.



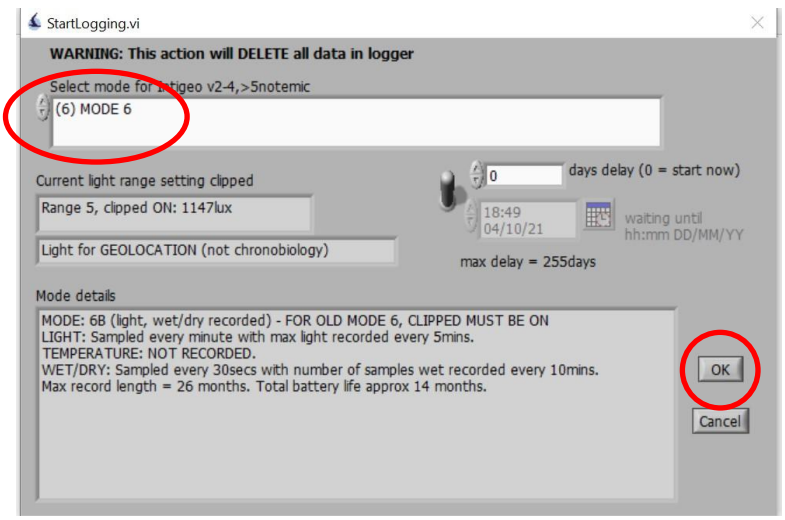
1. Next you are presented with a window where you have to select if light range should be **Clipped**. Check this box. This is the important step. (Note that 'range' can be 4 or 5 depending on logger model/firmware version)

Start-up/restarting Migrate Technology GLS-loggers

- ***NB! only after you are sure you have successfully downloaded the data from previous deployment.***

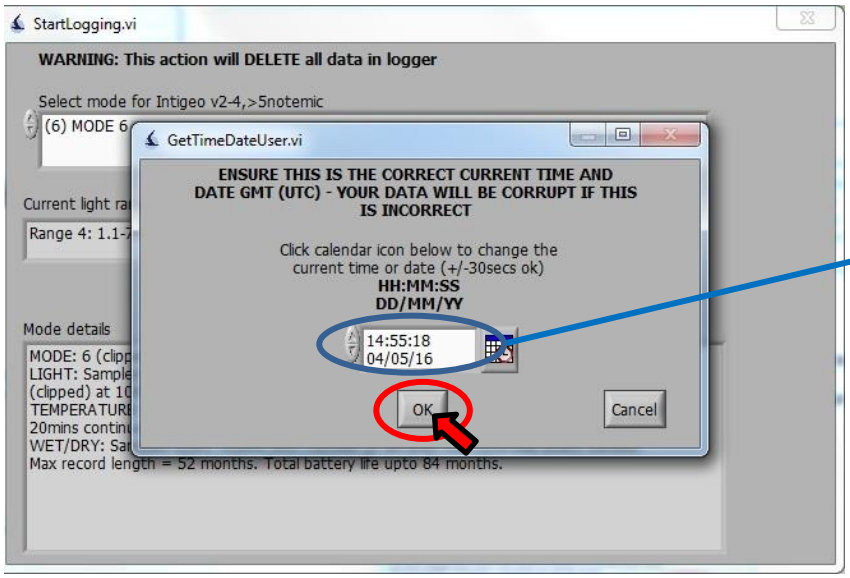


3. In the main module select “Start recording”.



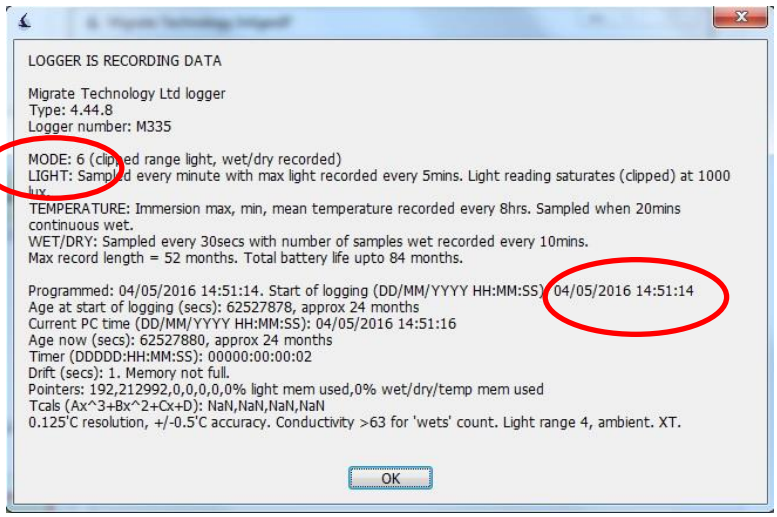
- Next you are presented with a window where you have to select recording mode. When first opened “Mode 1” is automatically selected, make sure to change this to **Mode 6** before selecting “OK”! This is the important step. (Note that 'range' can be 4 or 5 depending on logger model/firmware version)

Start-up/restarting Migrate Technology GLS-loggers



Make sure that date and time are correct according to GMT. Be sure that you have an accurate clock for comparison.

5. After selecting the correct recording mode make sure that time and date are correct (**GMT**) then select "OK". Make sure you have an accurate clock, preferably an online one, for comparison. **Note the start date and time (GMT) down in the Metadata-template in the "RESTART TIMES" sheet.**



6. When you have successfully turned the logger on, this message appears, double check whether MODE and /or start time are ok. Then you can proceed, either to processing the next logger or exit the program.

Pathtrack nanoFix® GEO mini for ‘leg ring attachment’

NEW !!!

2024 GPS model

Pathtrack Software Download and Installation, USB Drivers and Windows .Net Framework.

- Pathtrack software version ‘ArchivalUSB_SetupV3Pt27’ should be installed on your machine prior to setting up the tags.
- **Please contact** support@pathtrack.co.uk **for the latest version of the software.**

It is **essential** that this version of host software is installed, or any later versions subsequently provided by us, as previous versions will not be compatible with the additional programming features of these tags and will result in tags being incorrectly programmed and unlikely to operate correctly.

Product Summary:

Pathtrack nanoFix® GEO mini devices for ‘leg ring attachment’ are archival GPS logger devices which must be recovered in order to obtain their data. The model being provided is a non-solar device, hence they must be fully charged prior to deployment to maximise data collection. The devices do include an immersion sensor to avoid wasting GPS power when the tag is submerged. Finally, the tags also include an accelerometer that can be used to capture 3D behaviour data that aligns with the GPS data capture events as well as an immersion sensor that will provide regular wet/dry data.

Pathtrack nanoFix® GEO mini Deployment

NEW !!!

2024 GPS model

Pathtrack Logger Deployment (Mounting Advice):

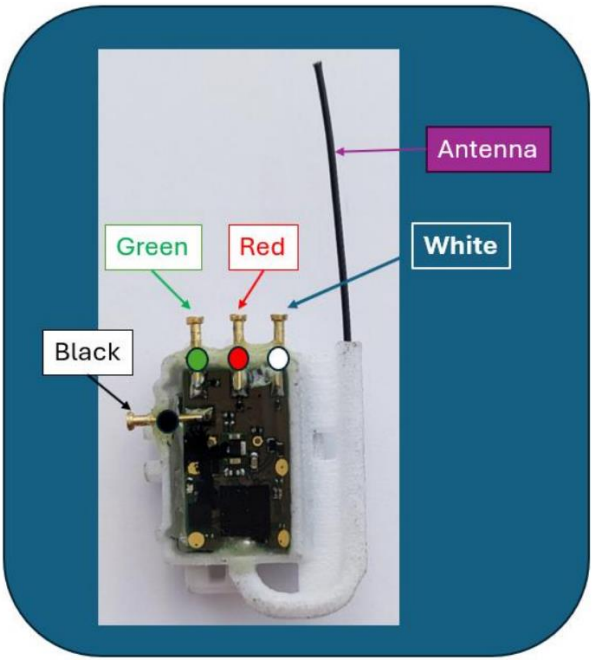


Figure 1. The tag with the position of the connector rings and antenna.

When attaching the Pathtrack devices to the animal, we recommend the following orientation for:

Guillemots: the antenna should be orientated in such a way that it is facing downwards away from the bird's body when the bird is stood upright and to make it point backwards when flying.

Gull sp., Common eider, European shag, Northern gannet: the antenna should be orientated in such a way that it is facing upwards, so that it does not hit the ground/get damaged when the bird stand upright.

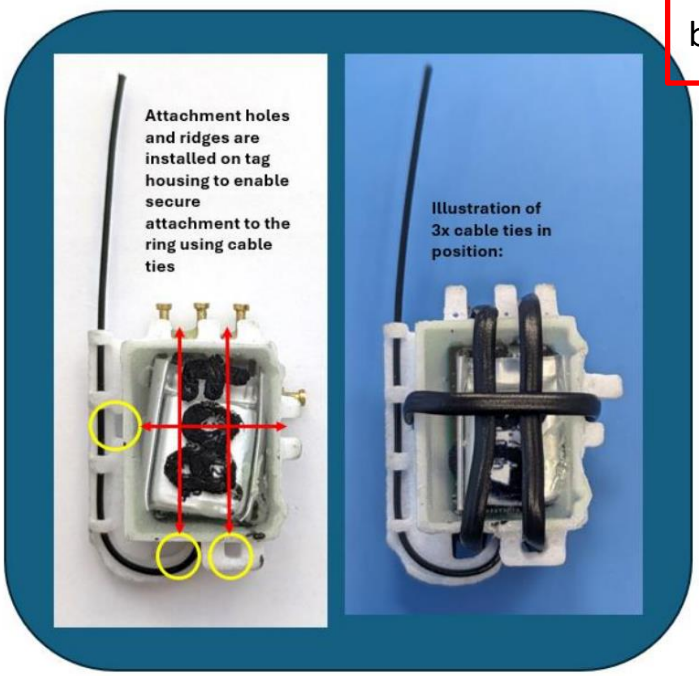


Figure 2. The tag housing is installed with 3x holes and outer ridges to allow for securely attaching the tag to the ring.

Pathtrack nanoFix® GEO mini Start-up loggers

NEW !!!

2024 GPS model

Start-up Pathtrack loggers

1. Device configuration involves the use of PC time to timestamp the GPS data on the device. To minimise time errors, ensure the PC has recently been synchronised to internet time. PCs can be set to any time zone with the configuration then set within that time zone. Hence a PC set to Central European Time during the summer months will be +2 hours in advance of UTC. Therefore, if a start time is set in the software at 14:00 then the first GPS will be taken at 14:00 CET, which will be equivalent to 12:00 UTC. The data output by the tags is always converted to UTC for simplicity when processing the data. Connect the Pathtrack Device via the USB Programmer Cable to the PC as per previous instructions.

2. Connect the Pathtrack Device via the USB Programmer Cable to the PC. These 2024 tags must only be connected to using the red programming/charging units provided in 2024. They must not be connected to using the white programming/charging units provided in previous seasons otherwise the batteries on the tags will be damaged resulting in reduced capacity and possibly tag failure. Connect the USB plug into the PC and then proceed to connect the nanoFix tag to the programming boar.

It is essential that the RED connector is not connected to any tag pin other than the RED pin.

See next page

Pathtrack nanoFix® GEO mini Start-up loggers

NEW !!!

2024 GPS model

3. The orientation as seen from above is shown in Figure 3.
   The cable grabbers should be attached to the corresponding tag pins in the following order:

   1. WHITE
   2. RED
   3. GREEN
   4. BLACK

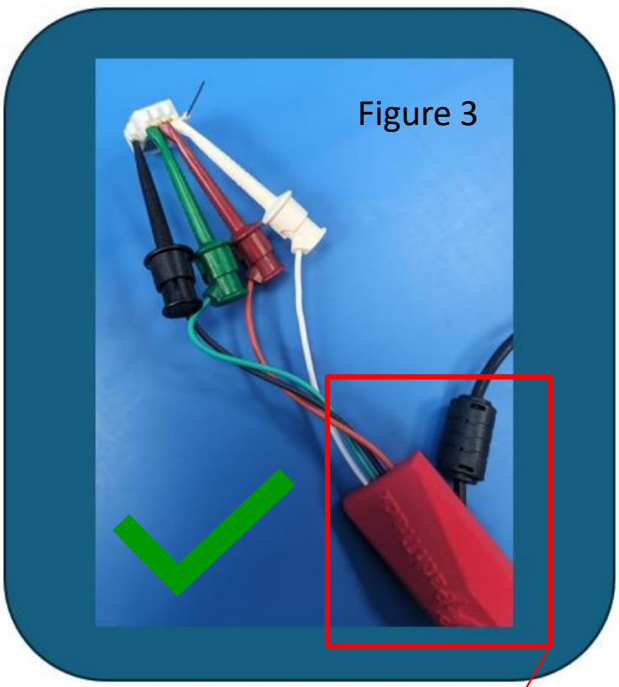
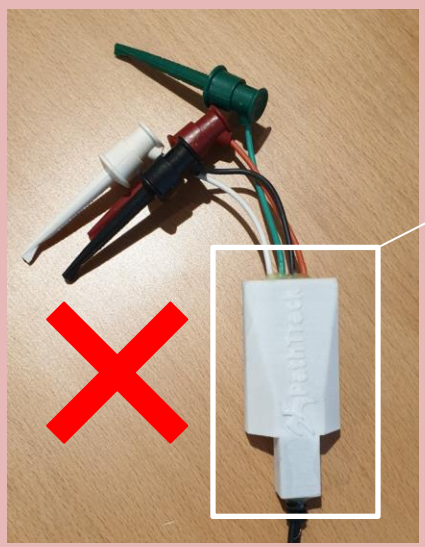


Figure 3

4. It is then essential to wait for the **RED LED** to light on the tag before progressing to connect the tag to the software.

It may take several minutes for the LED to light and remain lit.



IMPORTANT:

The WHITE programmer cables (which were supplied with the 2023 tags) must **NOT** be used with the **2024 tags** as the power is too strong and will damage the batteries.

The RED programmer cables can be used safely with the 2023 and 2024 tags.

NEW !!!

2024 GPS model

5. Open the Pathtrack software on your PC, then connect the software to the device by selecting the “Connect” option from the “Device” menu, see Figure 4.

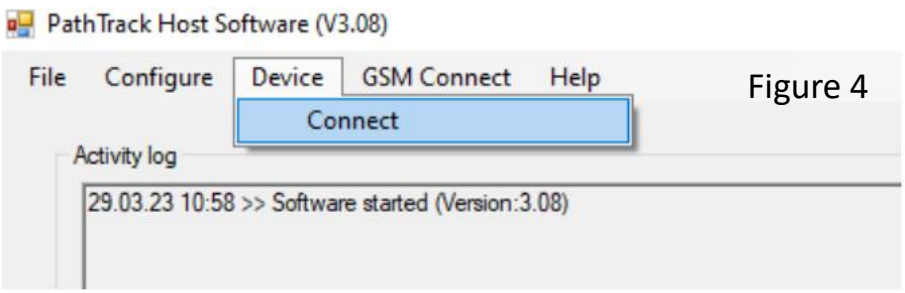


Figure 4

6. A dialog box will appear asking if you wish to update the device schedule. Select “Yes” to change the schedule or “No” for it to remain as it is.

7. If “Yes” is selected to change the configuration, then the configuration screen will then appear.

See next page

Pathtrack nanoFix® GEO mini Start-up loggers

NEW !!!

2024 GPS model

8. As these tags include an accelerometer there are two configuration screens that must be accessed and used in order to fully configure the tags. The two configuration screens appear as separate 'tabs' as illustrated in Figure 5 below; one is for 'GPS' configuration (as shown in Figure 5), and one for 'Accelerometer' configuration (as shown in Figure 6, next page).

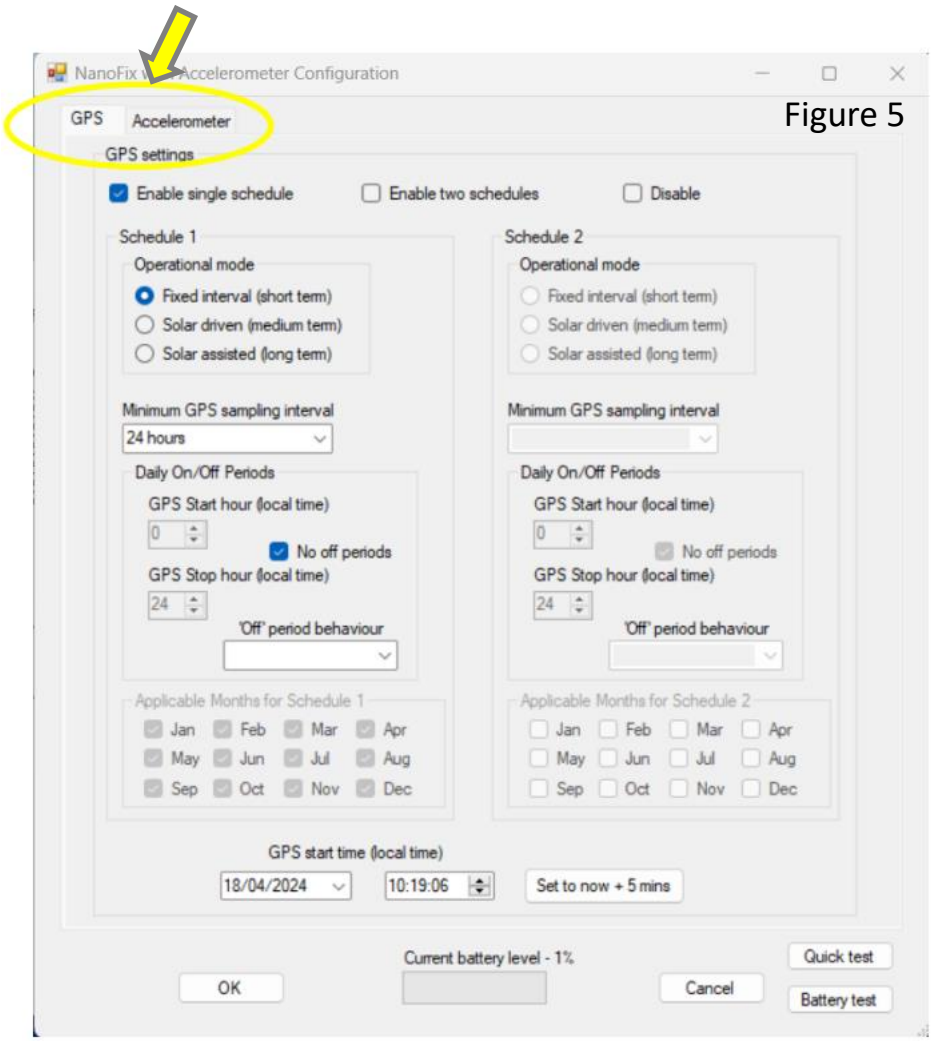


Figure 5

Pathtrack nanoFix® GEO mini Start-up loggers

NEW !!!

2024 GPS model

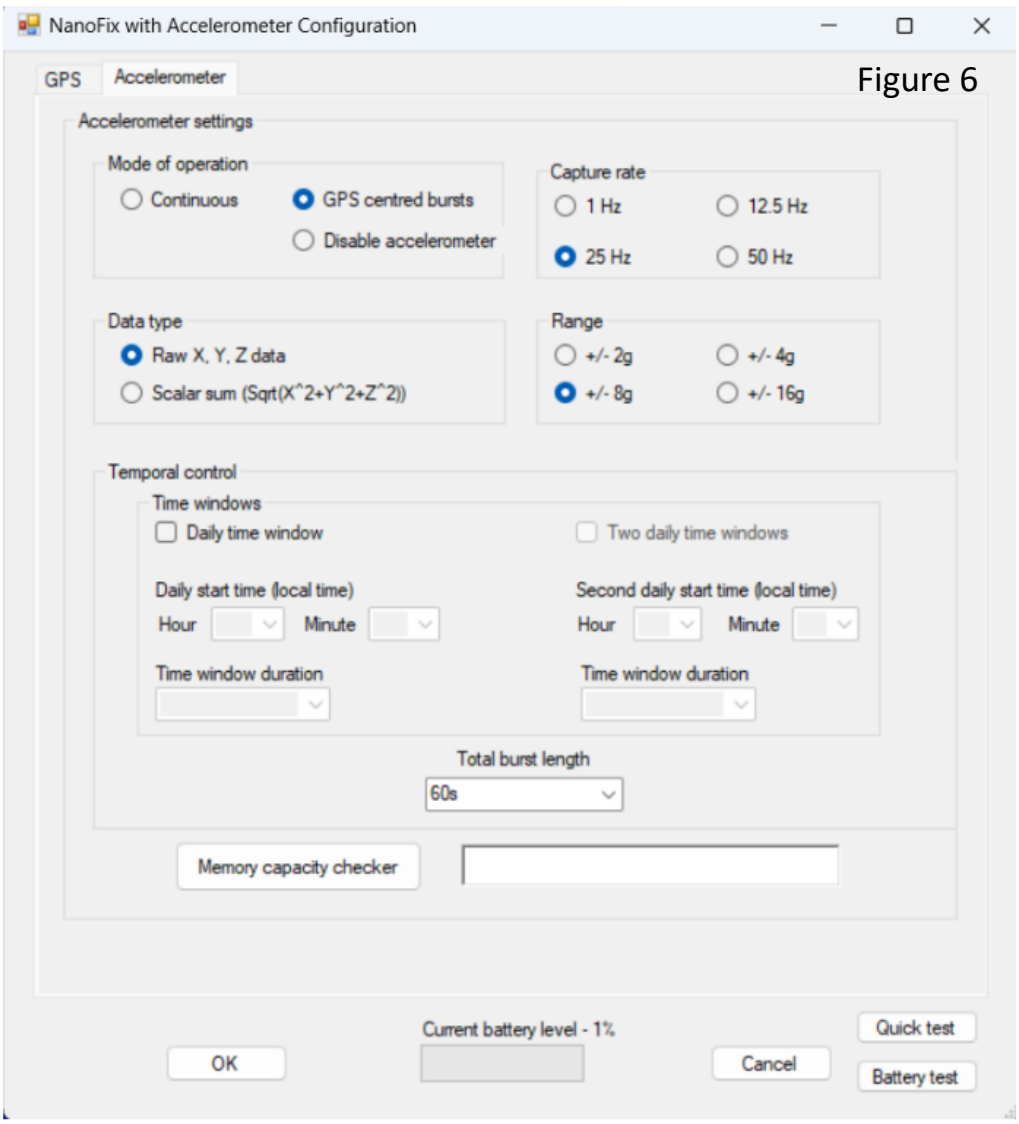


Figure 6

9. **The software will automatically pre-populate the recommended deployment settings for your tags. The recommended settings are shown in Figure 5 and Figure 6. Therefore, all that is required is to set the GPS start time and date for the tags on the GPS configuration screen and Click 'OK'.**

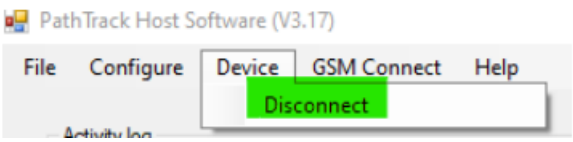
Pathtrack nanoFix® GEO mini Start-up loggers

NEW !!!

2024 GPS model

10. Within a few seconds a window should appear confirming that the schedule has been successfully updated on the device.

11. Select the “Disconnect” option from the “Device” menu.



12. The device can now be removed from the programmer*. *Carefully disconnect the grabbers from the device in the reverse order to which you connected them. Disconnect the grabbers in order: BLACK, GREEN, RED, WHITE

13. Immediately after being physically disconnected from the PC, the RED LED on the tag should flash ten times which confirms the tag is successfully programmed.

Pathtrack nanoFix® GEO mini Downloading

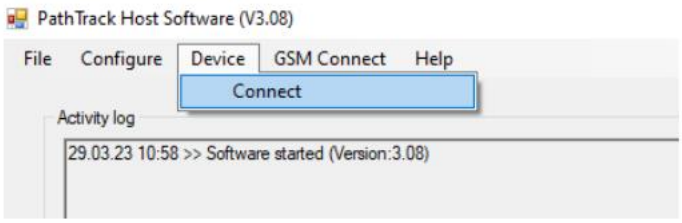
NEW !!!

2024 GPS model

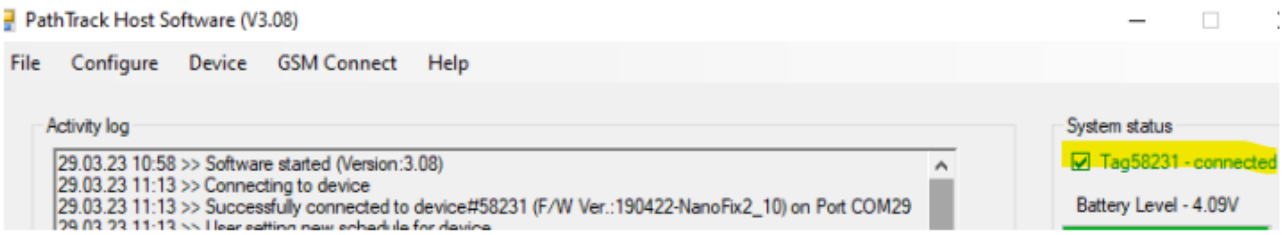
Steps to download data:

1. Connect the Pathtrack USB programming board/cable to the PC. To do this, follow the procedure in the previous section “start-up loggers”. Steps 2 – 4 carefully.

2. Connect the software to the device by selecting the “Connect” option from the “Device” menu.



3. In the Activity log window at the top of the software the ID of the device that has been connected to will be shown as illustrated below.



4. All data will download automatically from the device. A progress bar at the bottom of the software will provide the status of the download operation. Note that sometimes the download can pause for periods up to 30s. It is not necessary to do anything to reset the download – it will simply recover automatically. Note that with a full set of GPS and accelerometer data the download time could be some tens of minutes.

5. The number of data points downloaded will be indicated in the Activity log window.

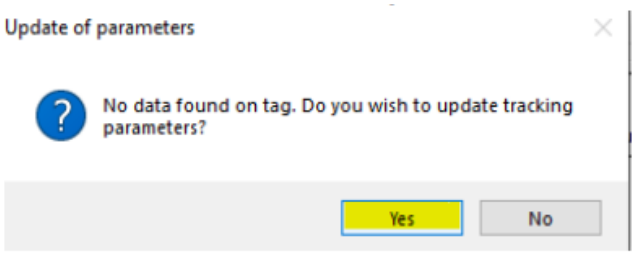
Pathtrack nanoFix® GEO mini Downloading

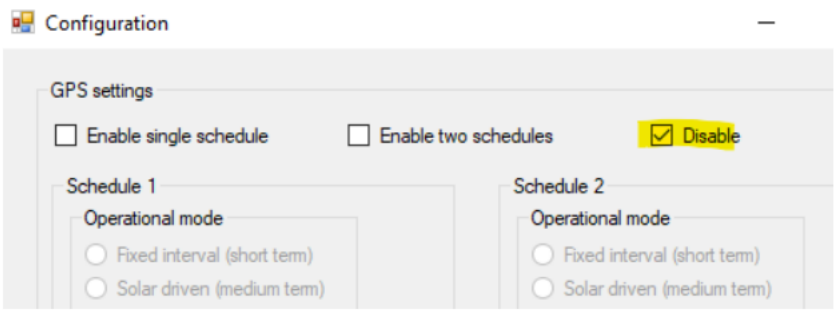
NEW !!!

2024 GPS model

6. The device should then be disabled

To disable tag - when prompted to Update Tracking Parameters select ‘Yes’ and then select ‘Disable’ at top of the Configuration Screen, and then ‘OK’





7. The tag can then be recharged in preparation for the next deployment. Each device will require up to a three-hour recharge between deployments to ensure the battery is fully charged.

8. After charging the battery and selecting the “Disconnect” option from the “Device” menu, the device can be removed from the programmer.

9. Carefully disconnect the grabbers from the device in the reverse order to which you connected them. Disconnect in order: BLACK, GREEN, RED, WHITE.

10. The LED on the device may remain lit for up to 5s after disconnecting.

Pathtrack nanoFix® GEO mini Downloading

NEW !!!

2024 GPS model

11. The downloaded data should appear in corresponding Tag folders in your PC directory:

    C:\Users*YOUR_PC_NAME*\AppData\Local\Pathtrack\archival_usb\logfiles

The GPS data will download as a .raw file. The file name structure for this file being as follows: 'ObsDDMMYY_HHMMSS_TagXXXXX.raw' (Where the first 6 digits are the date, the next six are the time and then the final five digits are the tag ID. The accelerometer data will download as a separate text file. The file name structure for this file being as follows: 'ObsDDMMYY_HHMMSS_TagXXXXXAccel.txt.'

Hard resetting the device:

1. If the device continually fails to connect to the PC, and the problem cannot be resolved through disconnecting of the device from the programmer, unplugging the cable from the PC, and restarting the host software before reattempting to connect, then it may be necessary to hard-reset the device. **Ensure that the tag pins are free from dirt and debris which may be interrupting the connection with the programmer cable grabbers.**

2. Note that if the device is currently active then resetting in this manner may lose up to 15 of the last location data sets taken by the device. All data prior to those will, however, be preserved.

3. The hard reset should be performed with the device connected to a PC via a programmer.

4. To perform the hard reset simply pass a strong magnet over the side of the device

Pathtrack nanoFix® GEO mini Processing data

NEW !!!

2024 GPS model

Processing data:

1. Note that an internet connection is required to process the data obtained by the nanoFix® devices in order to produce locations.
2. To process a data file, select the “Process Data” button on the right-hand side of the software.
3. Navigate to the appropriate device directory and select the file to be processed. Note that when the data was downloaded from the device the file name and path was written to the Activity log window.
4. If previous data has been processed, then the software will ask if the new data is to be appended to the existing data. Usually select “No” so that only the new data will exist in the workspace.
5. The software will automatically download all files it requires from the internet to process the data files.
6. The software will then prompt you for the estimated start position. Please enter a reasonably accurate position, certainly within 100km.
7. Provided the data set contains sufficient number of tracked satellites the data will automatically process.
8. Once completed the data can be saved via the ‘File->Save results to file’ menu so that it does not need to be processed again. Also, the .pos file produced can then be imported into Excel as it employs csv formatting.
9. The data can be viewed in Google Earth using the button near the bottom of the software window (provided Google Earth is installed and has been found by the software. If Google Earth has not been found by the software then this can be configured via the ‘Configure- >User Options’ menu)

Pathtrack nanoFix® GEO mini for ‘leg ring attachment’

2023 GPS model

For downloading the latest version of the pathtrack software, please following the instructions on page 31.

Product Summary:

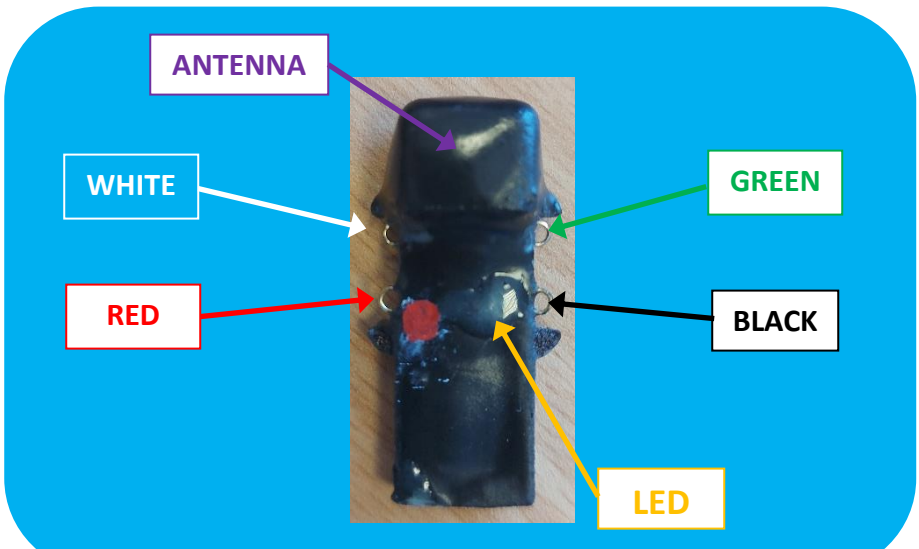
- Pathtrack nanoFix® GEO mini devices for ‘leg ring attachment’ are archival GPS logger devices which must be recovered in order to obtain their data. The two different 2023 models being provided are both non-solar devices, hence they must be fully charged prior to deployment to maximise data collection. The devices do include an immersion sensor to avoid wasting GPS power when the tag is submerged. The immersion sensor functionality operates via two of the four PC connections on the devices. It is essential that water runs off between these two rings and cannot pool, otherwise the sensor will continue to provide wet readings when the tag is not immersed and so the tags will then not provide GPS readings when they could and should do so. Finally, the tags also include an accelerometer that can be used to capture 3D behaviour data that aligns with the GPS data capture events.

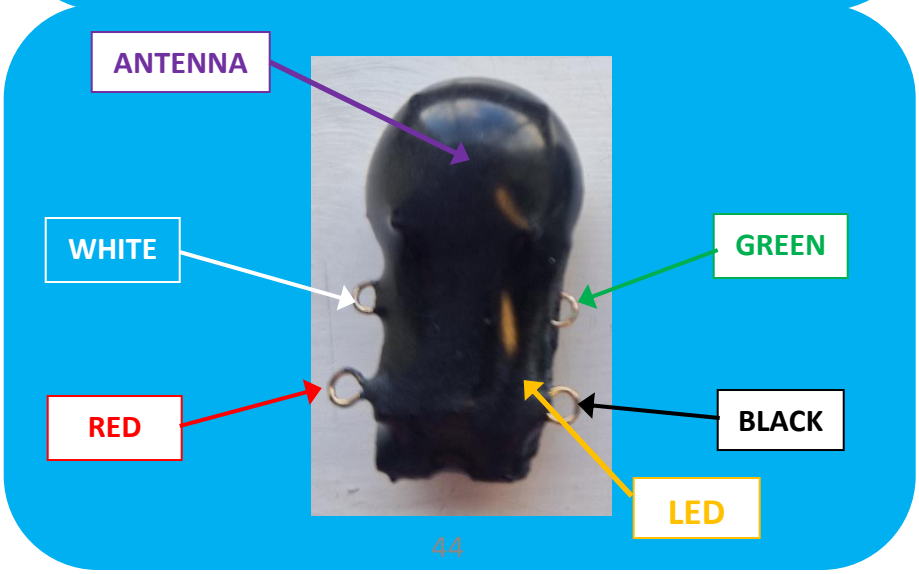
Pathtrack nanoFix® GEO mini Deployment

2023 GPS model

Pathtrack Logger Deployment (Mounting Advice):

1. When attaching the Pathtrack devices to the animal, it should be orientated in such a way that the antenna is facing towards the sky when attached to the leg ring and the bird is stood upright.
2. The saltwater switch on the two device types shown below are positioned between the RED and BLACK marked rings. Hence it is essential to keep the area between the red and black rings clear of any material that may affect the switch operation, i.e. water must be able to run off from this area of the tag without hindrance.





Pathtrack nanoFix® GEO mini Downloading

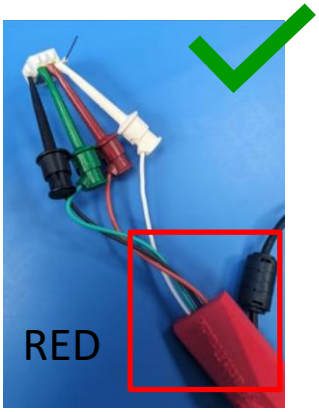
2023 GPS model

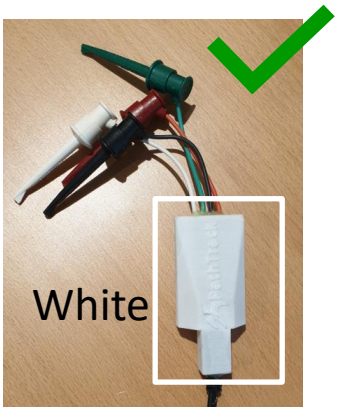
NOTE: Pathtrack loggers will keep data stored on the tag until the memory is full. Once the memory is full the tag will cease capturing further data to avoid overwriting critical deployment data. However, once data has been downloaded to the PC the full memory contents will automatically be available for the next deployment.

Steps to download data:

1. Connect the Pathtrack USB programming board/cable to the PC.

NEW !!!





The **WHITE** and the **RED** programmer cables can safely be used for the 2023 tag.

1. Carefully connect the nanoFix tag to the programming board using the following procedure, noting that the four wires of the programming board are colour coded. It is **essential** that the **RED** connector is not connected to any ring other than the **RED** rings indicated below. Although only shown in the images here on one of the tag configurations these will be marked with a red dot on all production units.

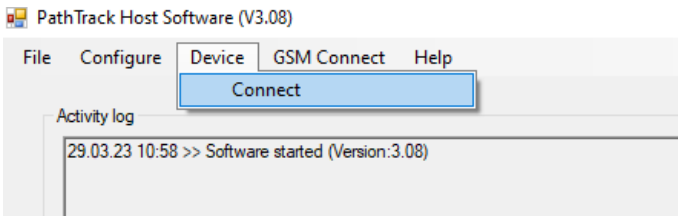
1. The orientation as seen from above the two different tag types is shown below. The **BLACK** wire must be connected first, followed by the **RED**. It is then essential that the next two connections are not made until the red LED on the underside of the device lights and remains lit. If the device is active it may take up to 4 minutes for the LED to light and remain lit. Once the LED is lit, the **WHITE** and **GREEN** can be connected in any order.

Pathtrack nanoFix® GEO mini Downloading

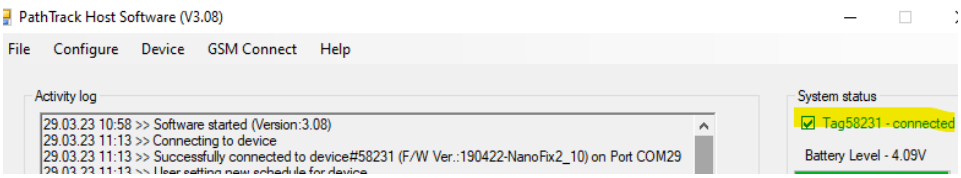
2023 GPS model

Steps to download data:

4. Connect the software to the device by selecting the "**Connect**" option from the "Device" menu.



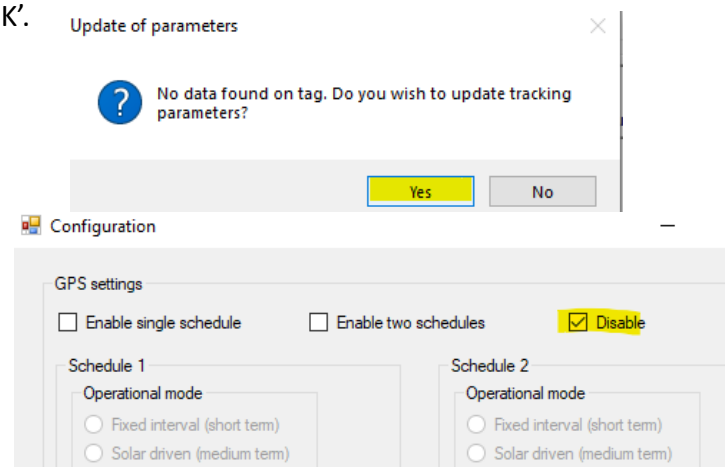
5. In the Activity log window at the top of the software the ID of the device that has been connected to will be shown as illustrated below.



6. All data will download automatically from the device. A progress bar at the bottom of the software will provide the status of the download operation. Note that sometimes the download can pause for periods up to 30s. It is not necessary to do anything to reset the download – it will simply recover automatically. Note that with a full set of GPS and accelerometer data the download time could be some tens of minutes.

7. The number of data points downloaded will be indicated in the Activity log window.

8. <u>The device should then be disabled.</u> To disable tag - when prompted to Update Tracking Parameters select 'Yes' and then select 'Disable' at top of the Configuration Screen, and then 'OK'.



Pathtrack nanoFix® GEO mini Downloading

2023 GPS model

9. The tag can then be recharged in preparation for the next deployment. Each device will require up to a three-hour recharge between deployments to ensure the battery is fully charged.
10. After charging the battery and selecting the “Disconnect” option from the “Device” menu, the device can be removed from the programmer.

11. Carefully disconnect the grabbers from the device in the reverse order to which you connected them. Disconnect in order: **Green and WHITE**, then **Red**, then finally **Black**

12. The LED on the device may remain lit for up to 5s after disconnecting.

13. The downloaded data should appear in corresponding Tag folders in your PC directory: C:\Users*YOUR_PC_NAME*\AppData\Local\Pathtrack\archival_usb\log files. The GPS data will download as a .raw file. The file name structure for this file being as follows: ‘ObsDDMMYY_HHMMSS_TagXXXXX.raw’ (Where the first 6 digits are the date, the next six are the time and then the final five digits are the tag ID.The accelerometer data will download as a separate text file. The file name structure for this file being as follows: ‘ObsDDMMYY_HHMMSS_TagXXXXXAccel.txt.’

Pathtrack nanoFix® GEO mini
Re-program tag

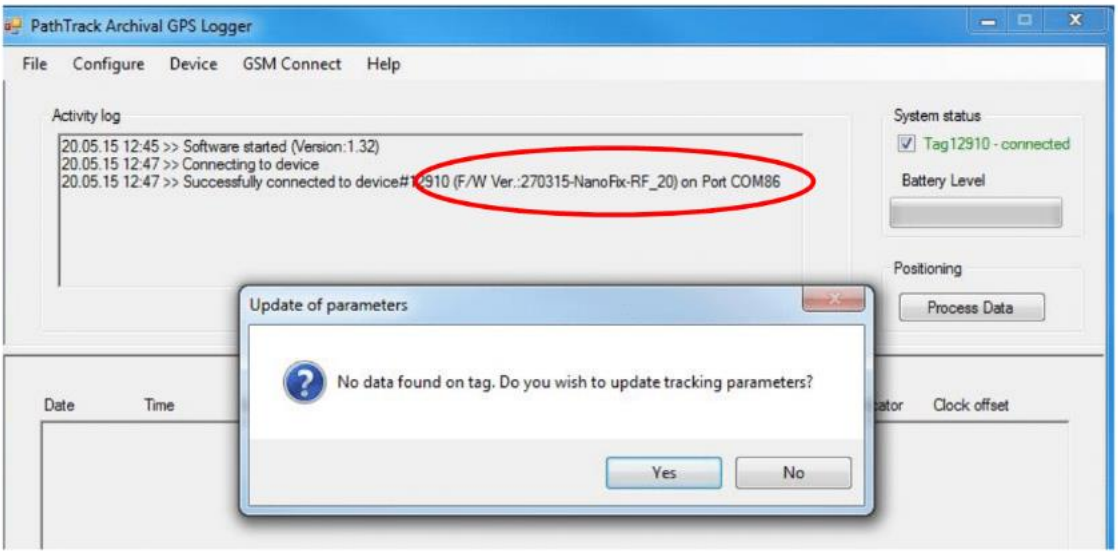
NEW !!!

2023 GPS model

Re-program pathtrack tag

For downloading the latest version of the pathtrack software, please following the instructions on page 31.

1. Connect tag/base station to PC and the Pathtrack host software as usual to check that connection is good and also so that we can check the COM port as shown below.



5. In the above window take note of the COM port number for the next step (in this case COM86). Also note the date of the firmware(270315 in the screen shot above).Using the Devicemenu select Disconnect and then close down the software.
6. Start the BootLoaderHost software by double clicking on it. The software will appear as shown below:

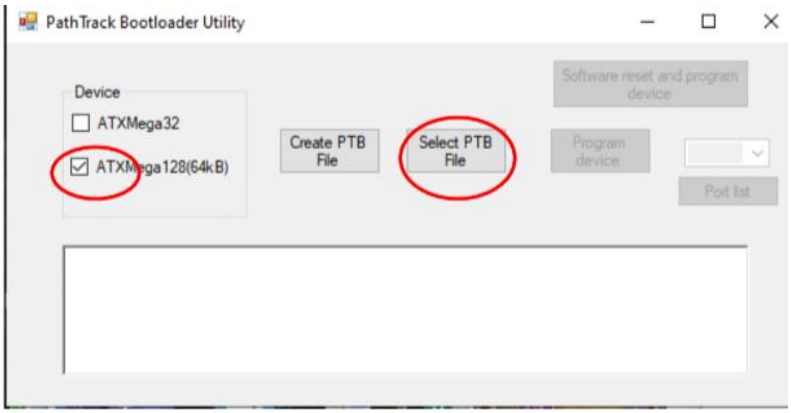
Pathtrack nanoFix® GEO mini
Re-program tag

NEW !!!

2023 GPS model

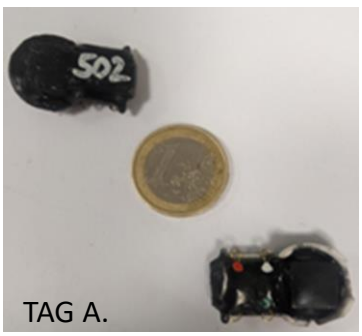
Re-program pathtrack tag

7. If your supplied PTB file has a file size of 32kB then select the ATXMega32 device below, or if your supplied PTB file has a file size of 64kB then select the ATXMega128(64kB) device. In the example that follows, a file size of 64kB is shown throughout.



7. Click the "Select PTB File" option. A File Explorer window will appear.

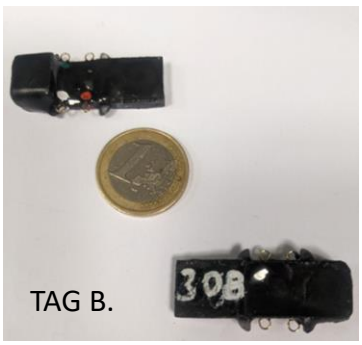
9. **IMPORTANT:** Choose correct firmware for tag model:



TAG A.

TAG A. These tags are 'deep dive (60m)' tags which have their own special firmware.

Please install onto these tags the firmware named **'Mini4Pt30+SWS_Board_accel_SWS_040324'**



TAG B.

TAG B. These tags are 'shallow dive (1m)' tags which have their own special firmware.

Please install onto these tags the firmware named **'LegRingBoard4Pt11_ant_accel__290224'**

10. Navigate to the directory in which the supplied PTB file(s) was/were saved and select the relevant firmware.

Note: The tags WILL NOT WORK if the wrong file is selected, even though the tags will accept it.

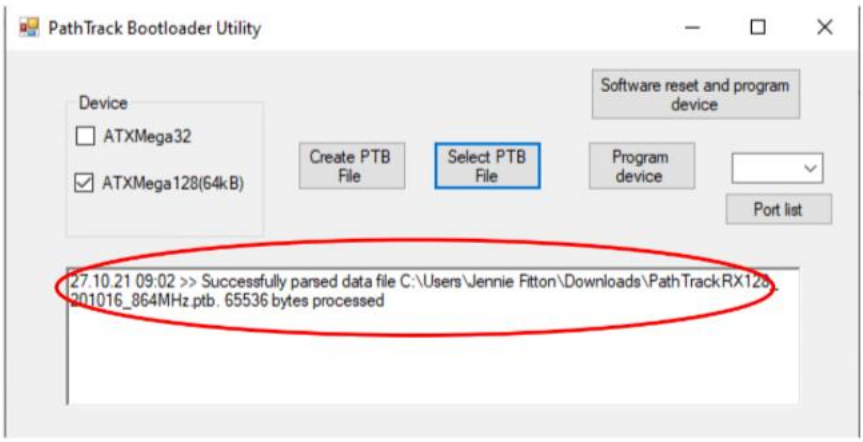
Pathtrack nanoFix® GEO mini
Re-program tag

NEW !!!

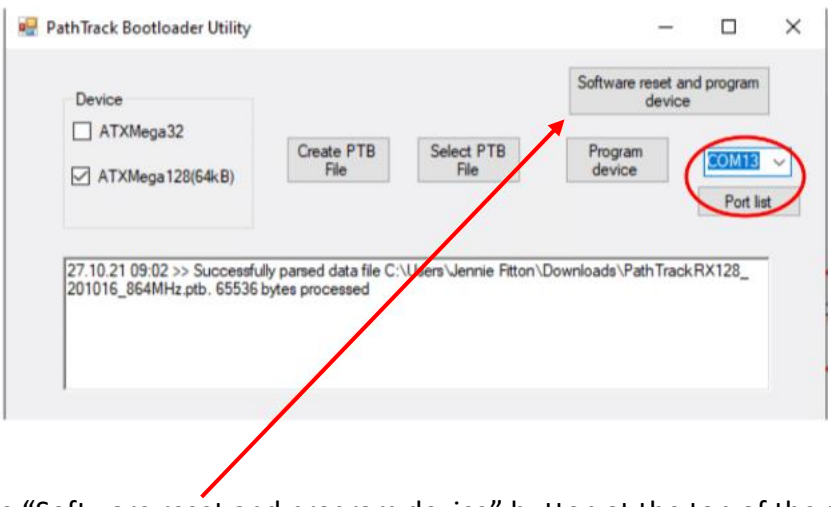
2023 GPS model

Re-program pathtrack tag

10. The file will be checked by the software and the results shown in the bottom of the window as shown below:



11. Change the COM port setting on the right-hand side of the software to the value noted earlier in step 5.To do this, click “port list”, then select the correct port from the dropdown menu.



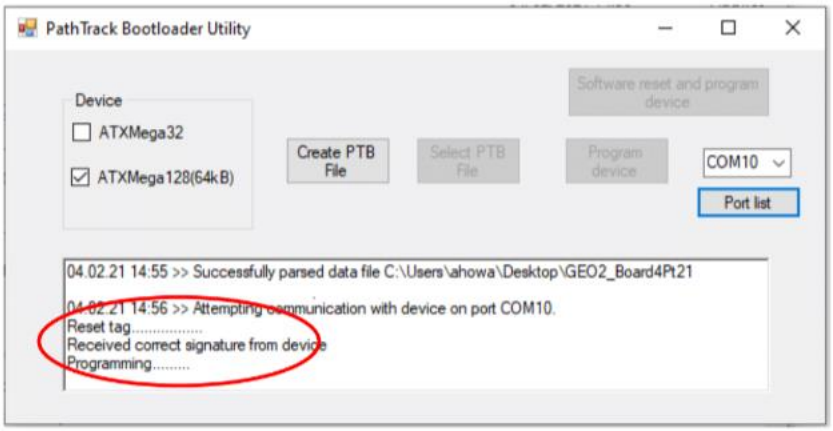
12. Click the “Software reset and program device” button at the top of the software.
13. The software will then attempt to communicate with the tag and reset it so that reprogramming can take place. The progress of this operation can be seen in the bottom window. Once programming begins the dotted line will grow across the screen as shown below. If this does not occur see step 17.

Pathtrack nanoFix® GEO mini
Re-program tag

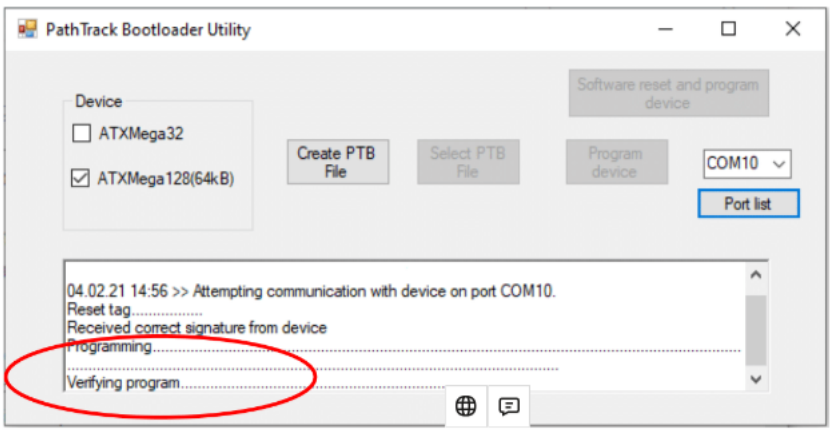
NEW !!!

2023 GPS model

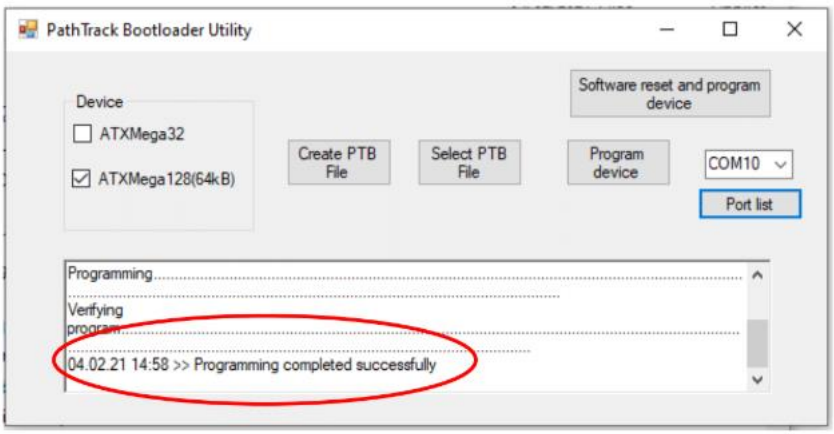
Re-program pathtrack tag



14. When programming is complete verification will be performed as shown below:



15. When verification is complete the software should indicate that programming has been completed successfully as shown below.



Pathtrack nanoFix® GEO mini
Re-program tag

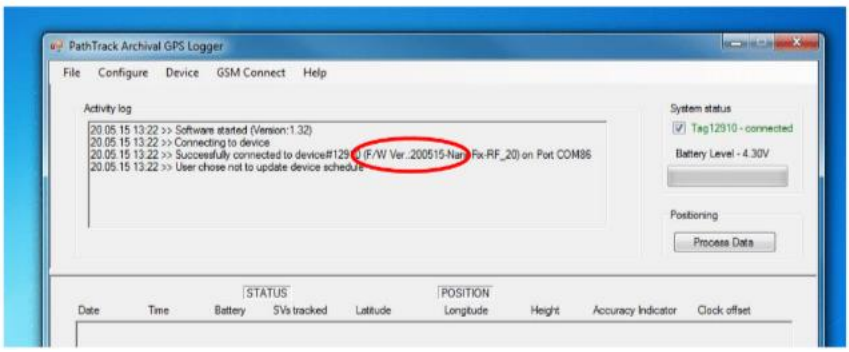
NEW !!!

2023 GPS model

Re-program pathtrack tag

16. The device can then be re-connected to the standard software so that it can be configured for testing.

Note: The firmware date shown in the activity log window in the software should now have been updated in accordance with the new supplied firmware.



17. If programming fails to complete successfully then a slightly different procedure must be adopted. This requires the use of a magnet in order to reset the tag manually at the appropriate time.
18. If this is necessary return to step 12 but instead of selecting “Software reset and program device ”hit the button “Program Device”.
19. The software will then wait for the user to reset the tag by printing “Reset tag” on the screen and a series of dots will appear whilst waiting for this to happen.
20. The user must swipe the tag with a magnet in a single clean motion along each side in turn. Once the software indicates “Received correct signature from device” then the magnet swiping should stop immediately.
21. The process should then complete successfully. If not ensure that the cable connection is as secure as possible and then retry programming using the method beginning at step 18.

NOTE: Once you have installed the firmware, when you connect your tags to the firmware the new firmware name should appear next to the Tag ID in your activity log window.

For the start-up of the loggers, please see instructions for Pathtrack 2024 GPS model.

Sampling for ARCTOX

Getting tissue samples from tagged individual is of great interest for the project, both with regard to diet and toxin exposure on wintering grounds. At the moment SEATRACK has not acquired the funds necessary to carry out any such analyses but we strongly encourage our participants to sample **feathers** from all individuals retrieved with GLS loggers. Such samples can then be analysed at a later date or, **if participants agree,** be analysed as a part of Jerome Fort's project ARCTOX.

Please note though:

A. ARCTOX is focussed on high latitude seabird populations, so it cannot be guaranteed that all samples delivered by SEATRACK participants will be analysed by ARCTOX. SEATRACK will however attempt to acquire funds to run such analyses in the future and therefore want to have available samples in place. We therefore request that all able participants sample feathers following the protocol detailed below and also encourage the collection of blood samples. We further encourage our participants to contact Jerome Fort to see if he is interested in additional samples **(jerome.fort@univ-lr.fr)**.

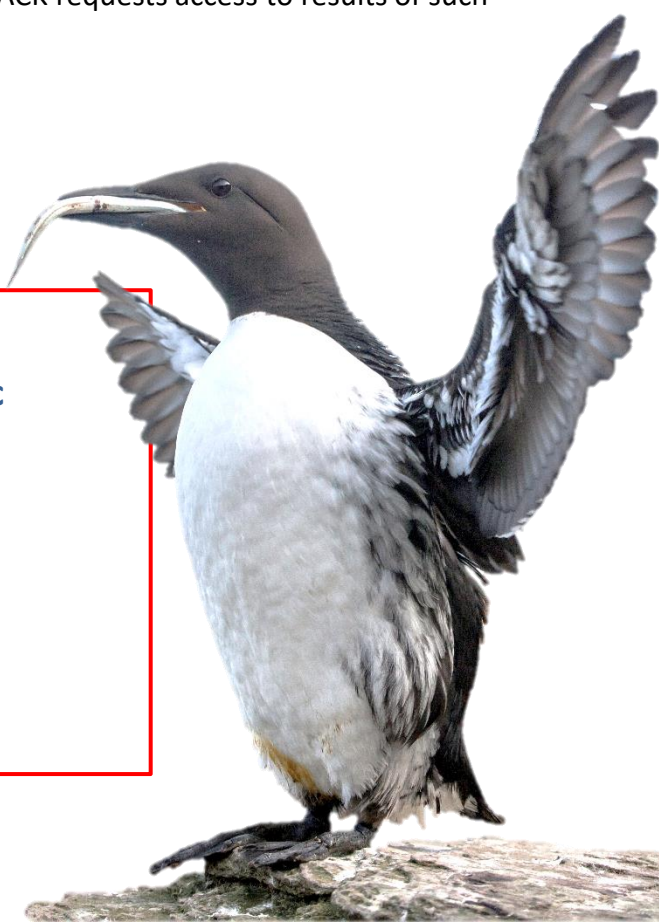
B. ARCTOX is primarily based on a community and large spatial-scale approach and will therefore not overlap with local and/or species-specific projects, for which ARCTOX results will be available (http://arctox.cnrs.fr/en/work-area/).

C. We are aware that at some localities pre-existing sample regimes are in place preventing participants from taking any additional samples. In such cases, with the agreement of participants as well as their collaborators, SEATRACK requests access to results of such analysis.

Send all samples to:
please contact Jerome Fort (jerome.fort@univ-lr.fr) to arrange delivery.

Short list of samples of interest:

- **SEATRACK/ARCTOX - Requested basic samples**
  - 6 body feathers: 3 belly and 3 back.
  - 10 head-feathers (Alcids and Larids).
- **ARCTOX - Additional samples**
  - 0,5-0,7 ml whole blood in 70% ethanol.



ARCTOX

Monitoring and understanding contamination of seabird communities on a pan-Arctic scale

ARCTOX in short…

The main objectives of the ARCTOX program are:

1. To monitor and map the year-round Hg contamination of the seabird community at the pan-Arctic scale, and its long-term changes.
2. To evaluate underlying processes and impacts of the large-scale Hg distribution.
3. To use the seabird community as bio-indicators to understand the pan-Arctic contamination of marine food webs.

ARCTOX sampling

The ARCTOX sampling regime is based on an international pan-Arctic sampling network and existing field campaigns, with the aim of collecting samples on various seabird species occupying different ecological niches, at a number of colonies spread throughout arctic regions.

- ARCTOX requires two different types of samples:
  - **Blood** - *provides information about recent contamination, i.e. exposure during the breeding season.*
  - **Feathers -** *Informative of past contamination, i.e. exposure between two moults during the non-breeding season.*
- **Blood and feathers should be collected on 20 birds for ARCTOX, all breeding adults, preferentially during the chick-rearing period. Retrieved logger birds should be prioritized, but sample-size can be inflated to 20 using birds being deployed for the first time or other birds.**

- **Importantly, this project is primarily based on a community and large spatial-scale approach. Data remain available to all partners for local and/or species-specific projects at: https://arctox.univ-lr.fr.**

Major changes in the protocol since 2020

- No feather specifically collected for molecular sexing (calamus of Hg/SI feathers can be used).
- Both Body AND Head Feathers should be collected on all Alcid and Larid species
- Juveniles equipped with a logger should be sampled
- Less body feathers are required

Please contact Jerome (jerome.fort@univ-lr.fr) if you can/plan to collect samples for ARCTOX. Jerome will then provide sampling equipment such as syringes, vials etc.

SEATRACK/ARCTOX

Sampling protocol 2024

Body feathers (All species)

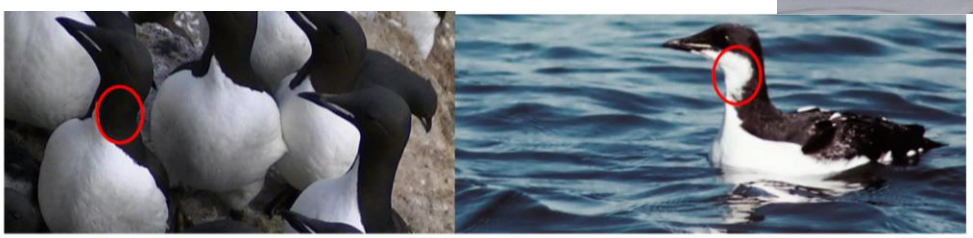
- **At least all individuals retrieved with GLS loggers + other birds to reach 20.**
- Minimum of **3 belly feathers + 3 back feathers should be collected (total of min. 6)**
- Half from the belly and half from the back.
- Not flight feathers.
- Pluck feathers rather than cut (better for regrowth).
- Place and seal in plastic zip-lock bag when dry.
- Mark each bag with species, site, individual ID (e.g., metal ring-number and/or logger ID), year and sample type, i.e. "Body-feathers". Store at ambient temperatures.
- Intended for SIA, Hg, and corticosterone.

Head/Throat feathers (only Alcids and Larids)

- ALCIDS: Minimum 10 black feathers from the throat (see figure).
  LARIDS: minimum 10 feathers from the top of the head.
- Pluck feathers rather than cut (better for regrowth).
- Place and seal in plastic zip-lock bag when dry.
- Mark each bag with species, site, individual ID (e.g., metal ring-number and/or logger ID), year and sample type, i.e. "Head-feathers". Store at ambient temperatures.
- Intended for SIA, Hg, and corticosterone.

Whole blood samples (All species)

- **Total requested is 0.5 mL – 1 mL blood (**Intended for Hg, Se and SIA).
- **Place 0.5-1 ml of blood** in a vial with **~1 ml of ethanol 70%**.
- Store the vial at **ambient temperature** or in a freezer if available. Mark the samples with species, site individual ID (e.g., metal ring-number and/or logger ID), year and sample type, i.e. "Blood Hg/SIA".



Collection of Head feathers in alcids (except atlantic, tufted and horned puffins)

Collection of Head feathers in puffins (atlantic, tufted and horned puffins)

Effect studies

It is important to assess whether or not GLS loggers affect “our” seabird behaviours and life-histories. To do so, proper control groups are necessary. A meaningful control sample is a group of birds that could have been equipped but were not. To define such a group, one must ideally explicitly spell an **assignment mechanism** before starting the deployment (it could be as simple as assigning every other captured bird or every third captured bird to the control group). It is important that control birds are **not biased towards birds in lower condition and/or birds harder to capture**.

Moreover, beyond the bird condition or trap-happiness/shyness components, two additional important aspects have to be taken into account to be sure the control group is meaningful:

- **Timing of capture**: this timing should be randomly distributed among GLS- and control birds (i.e. do not start by deploying or retrieving loggers and then, when you are done, start capturing control birds).
- **Area of capture**: GLS- and control birds should ideally be part of the same plot or area. If not possible, they should at least be in areas as close and similar as possible.

Having such a control groups is important for both adults and chicks, and the same rules apply for determining a proper control group for both age classes.

- In many systems, including a proper control group may mean to decrease the number of loggers deployed or retrieved. This is up to each site leader to decide whether this is worth it or not. It could also mean that field work expenses would increase. In such a case, get in touch with the SEATRACK project group before the field season to discuss what is feasible.

Field notes and Metadata

Please read before filling in the metadata template provided

Please bear in mind that one of the key aspects to success of a large-scale operation such as SEATRACK is standardized procedures. That is especially important when it comes to filling in the metadata-sheet. We therefore urge you to read the instructions carefully and **please turn in the metadata-sheets as soon as possible after the field-season ends.**

Our metadata template consists of four excel sheets:

- **The metadata sheet:** columns that are considered mandatory and/or of high importance are **coloured green**. We urge participants to record as many of them as possible.
- **Logger returns:** Field teams note down date of download, if a download was successful or not, and where the logger will be sent to after the field season (if not redeployed).
- **Restart times:** Retrieved loggers that are redeployed need to be restarted in the field. Exact date and time of download should be noted in this sheet in GMT!
- **Allocation list:** This sheet is only meant as support to the field team and contains information on all loggers that has been allocated to the colony before the field season.

- When possible, we provide predefined registry-options in dropdown-lists, to better standardize data registration and to simplify the process.

- If you are in doubt how to fill a column, note that each column header in the excel file is commented (marked with red triangle in the upper right corner). If you are still in doubt, you can find a detailed description on the following pages.

Field notes and Metadata

Sheet 1: Encounter data

Ringing info

General information about individual ring id's.

- **Date, [Mandatory] Fixed format:** "dd.mm.yyyy". (Note that this refers to the date of an encounter being registered NOT necessarily the original ringing date when the bird was first ringed.)
- **ring_number, [Mandatory].** Metal ring ID (e.g. '6294566', 'CA22632', '39445432')
- **euring_code, [Mandatory].** Abbreviation for ringing centrals issuing the metal rings (e.g. "NOS" for Stavanger museum in Norway, "NOO" for the ringing central in Oslo, Norway, "ISR" for the Natural history museum in Iceland, "RUM" for the ringing central in Moscow, etc... A more comprehensive list can be found here: http://www.euring.org/data_and_codes/euring_code_list/euring_exchange-code_2000.pdf)
- **color_ring, [Optional].** Suggested entries are colour and/or ring code (e. g. Black (J3215), Red(ABB), etc)

Logger Info

Id's and general information about logger or loggers retrieved, deployed or otherwise observed in relation to the registrations. All registries mandatory.

- **logger_status, [Mandatory].** How was the individual carrying the logger/loggers observed, Predefined choices (Note that all observations are valuable even if the bird is not caught):
  - individual caught (first deployment)
  - individual caught (logger retrieved and replaced)
  - individual caught (logger lost and replaced)
  - individual caught (logger retrieved, bird released without logger)
  - individual caught (logger lost, bird released without logger)
  - individual observed (logger still attached)
  - individual observed (logger lost)
  - individual observed (logger status unknown)
  - individual found dead (logger still attached)
  - individual found dead (logger lost)

- **logger_model_retrieved, [Mandatory provided a logger is retrieved].** Select the appropriate model from the predefined options on the dropdown list:
  - **c250**
  - **c65**
  - **c65_super**
  - **w65**
  - **mk3006**
  - **mk3005**
  - **mk4083**
  - **mk4093**
  - **mk15**
  - **mk18**
  - **mk9**
  - **mk13**
  - **c330**
  - **f100**
  - **mk14**
  - **LAT2500**
  - **Other**
  - **nanoFix_GEO_mini**

- **logger_id_retrieved, [Mandatory].** Register the Id of the logger retrieved, both the series number/letter and the individual ID number
- **logger_model_deployed, [Mandatory].** Select the appropriate model from the predefined options on the dropdown list, see predefined selection above under: **"logger_model_retrieved"**
- **logger_id_deployed , [Mandatory].** Register the Id of the logger deployed, both the series number/letter and the individual ID number

Field notes and Metadata

Sheet 1: Encounter data

Individual information

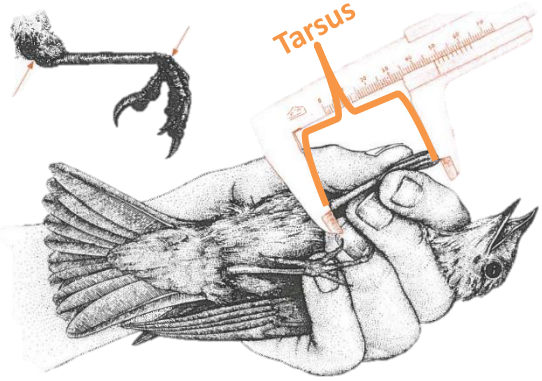
Register general information about the individual carrying the registered logger/loggers.

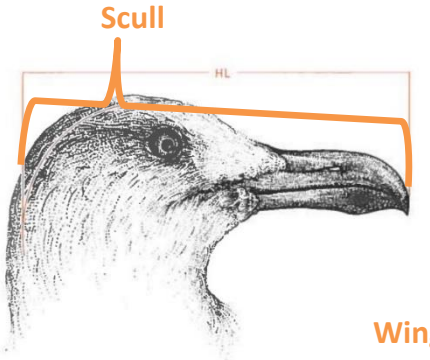
- **species, [Mandatory]** (Select one of the species under study in SEATRACK, registered on the predefined drop-down list.
- **morph, [Optional].** Requested if appropriate and registered/known (e.g. “bridled” or “non-bridled”)
- **subspecies, [Optional].** Requested if appropriate and registered/known (e.g. “fuscus intermedius”, “fuscus fuscus”)
- **age, [Optional].** Requested if registered/known. Selection criterions in dropdown list include “adult_unknown” if exact age in years in years is not known, “subadult” and pullus. If exact age is known, select the appropriate number.
- **sex, [Mandatory].** Select the appropriate option in the predefined drop-downlist: “male”, “female” or “unknown”.
- **sexing method, [Mandatory].** Select the appropriate option in the predefined drop-downlist: “dna”, “morphology”, “behaviour” or “none_yet”).

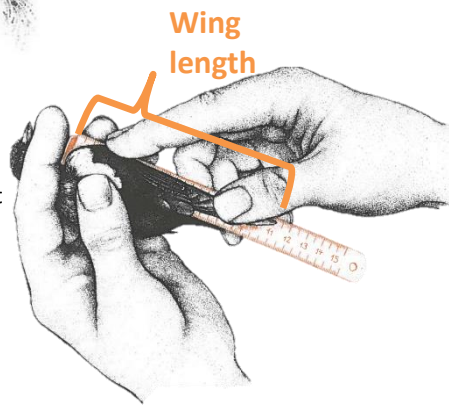
Morphometrics

Only weight is considered mandatory but all measurements taken are of interest and value to the project.

- **weight, [Mandatory],** fixed format; value in grams.
- **scull, [Optional].** Requested if registered/known, fixed format; value in mm. (Note, scull= head + bill)
- **tarsus, [Optional].** Requested if registered/known, fixed format; value in mm.
- **wing, [Optional].** Requested if registered/known, fixed format; value in mm. (Note, measure from carpal joint to tip of primary, flattened wing)







We realize you might have your own method but we recommend the measurements are taken as follows, if possible. If not please make a note of it when turning in the metadata-sheet.

Tarsus (mm)From the joint between tarsus and toes to the intertarsal joint. Toes are bent backwards ~ 90° to the tarsus with tibia at the same angle. Measured with callipers to the nearest 0.1 mm.

Wing length (mm) Maximum chord length measured with a ruler to the nearest 1 mm. Carpal joint pressed against stopper and primaries flattened paralell to the scale of the ruler.

Weight (g) Mass of the bird measured with a spring balance (pesola). Remember to account for weight of the bag that the bird is weight in

Scull (mm), maximum distance from the back of the head to the tip of the bill measured with callipers with accuracy of 0.1 mm.

Illustations by Nils Hoff from Deutsche Ornithologen-Gesellschaft (2011), Measuring birds/Vögel vermessen.

Field notes and Metadata

Sheet 1: Encounter data

Breeding status

General information about breeding status of logger carrying individuals on deployment/retrieval/observation event and if obtainable, breeding success of that individual.

- **breeding_stage, [Mandatory].** Select, from a predefined dropdown list, the appropriate breeding status for the individual **at the time of handling**. Predefined options include:
  - nonbreeding/failed_breeder
  - prebreeding
  - incubating
  - rearing chicks
  - breeding/stage_unknown
  - failed breeder
- **eggs, [Mandatory].** Enter the number of eggs in the nest **(at the time of handling**)
- **chicks, [Mandatory].** Enter the number of chicks in the nest **(at the time of handling**)
- **hatching_success, [Mandatory].** Select "1" if at least one egg is known to have hatched, i.e. full or partial hatching success, "0" no hatching success at all and "unknown" if unknown.
- **breeding_success, [Mandatory].** Select "1" if at least one chick was alive during the last visit, but then note that "**breeding_success_criterion**" must be specified as well. If nest was fully predated after hatching was known to have occurred select "0". If breeding status was not checked after initial encounter or is not known for any other reason select "unknown".
- **breeding_success_criterion, [Mandatory].** If, you have registered the breeding success, you are requested to specify by which criterion you judge it to be successful or failed. (e.g., nest is defined to be successful if at least one chick was observed alive apparently older then 10 d, 15 d or if it was known to have fledged) To simplify and standardise the following criteria are provided in a dropdown-list:
  - 10d
  - 15d
  - 20d
  - 25d
  - 30d
  - fledging
  - none

Field notes and Metadata

Sheet 1: Encounter data

Breeding location

General information about location of study sites. All fields mandatory except for "nest_id"

- **country, [Mandatory].** Select the appropriate country from a predefined dropdown list, i.e., "norway", "russia", "iceland", "faroe islands" or "great britain".
- **colony, [Mandatory].** Enter the name of the colony or location. Choose the lowest common geographical unit, e.g name of cliff or island, where the work has been carried out.
- **colony_latitude, [Mandatory].** Fixed format, **decimal degrees** (e.g. 65.4967).
- **colony_longitude, [Mandatory].** Fixed format, **decimal degrees**, positive values for longitude east of Greenwich and negative values for west (e.g. 15.4967).
- **nest_id, [Optional].** Nest identification, if registered can be entered in this column, as noted by participants.

Samples

Please specify if any samples are taken from individuals deployed with loggers and for what purposes.

- **blood_sample, [Mandatory].** Select the appropriate choice from the predefined dropdown list, i.e.,
  - No, no blood was sampled
  - Yes, blood was sampled for SEATRACK/ARCTOX – Full sample (Both samples)
  - Yes, blood was sampled for SEATRACK/ARCTOX – Limited sample (Only SIA and Hg)
  - Yes, blood was sampled for SEATRACK/ARCTOX – Limited sample (Only PAH)
  - Yes, blood was sampled for a different reasons - results can/may be accessed by SEATRACK
  - Yes, blood was sampled for a different reasons - results can/may NOT be accessed by SEATRACK
- **feather_sample, [Mandatory].** Select the appropriate choice from the predefined dropdown list,
  - No, no feathers were sampled
  - Yes, feathers were sampled for SEATRACK/ARCTOX – Full sample (Body,head(alcids),sexing)
  - Yes, feathers were sampled for SEATRACK/ARCTOX – Limited sample (Please specify in comments)
  - Yes, feathers were sampled for a different reasons – results/sample can/may be accessed by SEATRACK
  - Yes, feathers were sampled for a different reasons – results/sample can/may NOT be accessed by SEATRACK
- **other_samples, [Optional].** Requested if appropriate. If any other samples are obtained from an individual carrying a GLS logger please specify what type and for what purposes. (e.g. "cloacal swabs, immunological studies", "Ticks or other parasites sampled", etc.)

Please note that SEATRACK encourage feather-samples from all individuals retrieved with loggers if sampling is not in conflict with existing projects. Unless specially requested ARCTOX will have access to all samples.

Field notes and Metadata

Sheet 1: Encounter data

Other

Other information relative to the deployment/retrieval/observation of the individual or data sampling in general.

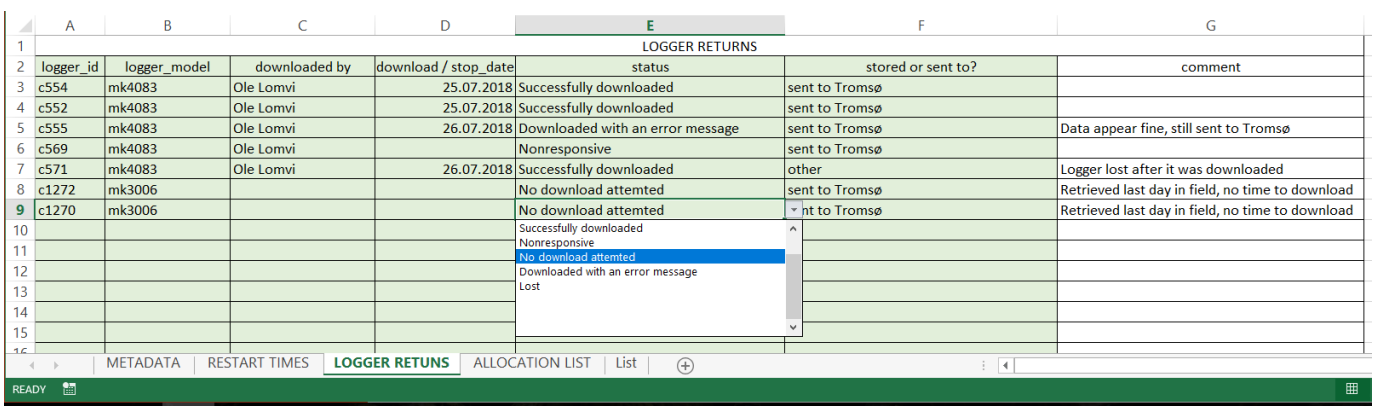
- **data_responsible, [Mandatory].** Specify name of person/persons responsible for the data, who should be contacted regarding publication of data
- **back_on_nest, [Optional].** Requested if observed and registered. If possible to observe please make a note if bird is observed returning to nest after handiling, i.e. “yes” if bird returns, “no” if nest is abandoned and unknown if no further observations are available.
- **logger_mount_method, [Optional].** Requested if appropriate. Almost all SEATRACK loggers are mounted on plastic rings placed on the birds tarsus. If you deviate from this we request you make a note of it, e.g., “logger attached to a ring placed on tibia”, “logger placed on back in a harness”, etc**.**
- **comment, [Optional].** Requested if appropriate. Please enter any comments you feel that are of importance e.g. relevant to the individual, the logger, nest site etc.
- **other relevant variables, [Optional].** Any additional measurements and variables recorded can be placed in columns to the right of the main sheet.

Field notes and Metadata

Sheet 2: Logger returns

LOGGER RETURNS: We ask participants to register download- attempts, if a download was successful or not, and where the logger will be sent to after the field season (if not redeployed). This is vital to keep track of loggers, allowing us to better utilize project assets thereby reducing costs and increasing the number of loggers available each year. Please fill out the following the best you can:

- **logger_id** Register the Id of the logger retrieved, both the series number/letter and the individual ID number
- **logger_model** Select the appropriate model from the predefined options on the dropdown list:
  - **c250**
  - **c65**
  - **c65_super**
  - **w65**
  - **mk3006**
  - **mk3005**
  - **mk4083**
  - **mk4093**
  - **mk15**
  - **mk18**
  - **mk9**
  - **mk13**
  - **c330**
  - **f100**
  - **mk14**
  - **LAT2500**
  - **Other**
  - **nanoFix_GEO_mini**
- **downloaded_by,** name or initials of person downloading the logger
- **download_date,** register when the logger download was attempted
- **Status**
  - Not used, still running
  - Not used, stopped (sleep mode)
  - Successfully downloaded
  - Nonresponsive
  - No download attempted
  - Downloaded with an error message
  - Lost
- **Stored_or_sent_to?**
  - sent to Tromsø
  - sent to another location
  - shutdown and stored at location
  - other
- **comment**

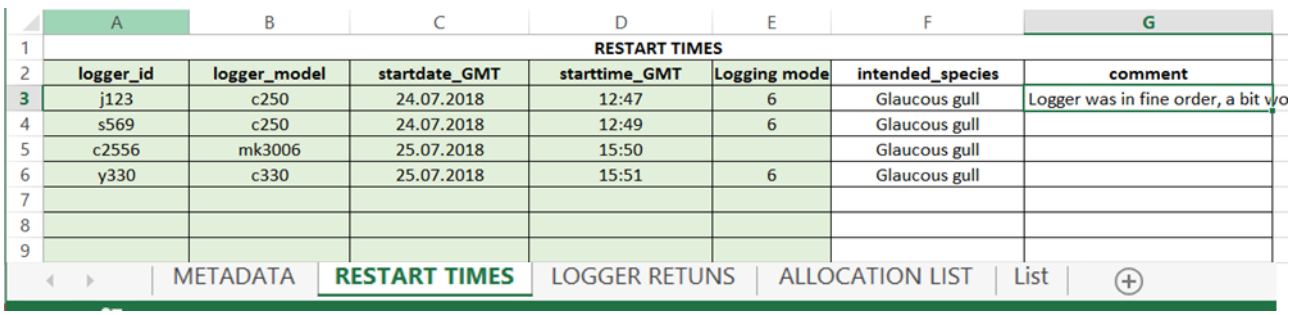


Field notes and Metadata

Sheet 3: Restart times

RESTART TIMES: Field teams note down date and time (in GMT!) of loggers started in the field.

- **logger_id,** register the Id of the logger retrieved, both the series number/letter and the individual ID number
- **logger_model, s**elect the appropriate model from the predefined options on the dropdown list:
  - **c250**
  - **c65**
  - **c65_super**
  - **w65**
  - **mk3006**
  - **mk3005**
  - **mk4083**
  - **mk4093**
  - **mk15**
  - **mk18**
  - **mk9**
  - **mk13**
  - **c330**
  - **f100**
  - **mk14**
  - **LAT2500**
  - **Other**
  - **nanoFix_GEO_mini**
- **Startdate_GMT,** register the date (GMT) when the logger has been started
- **Starttime_GMT,** register the time (GMT) when the logger has been started
- **Species,** Please select the species that the logger is intended to be reused on (Select one of the species in SEATRACK, registered on the predefined drop-down list.
- **Logging mode,** specify logging mode/settings (for Migrate Technology GLS or Pathtrack GPS loggers)
- **comment**



	A	B	C	D	E	F	G
1	RESTART TIMES						
2	logger_id	logger_model	startdate_GMT	starttime_GMT	Logging mode	intended_species	comment
3	j123	c250	24.07.2018	12:47	6	Glaucous gull	Logger was in fine order, a bit wo
4	s569	c250	24.07.2018	12:49	6	Glaucous gull	
5	c2556	mk3006	25.07.2018	15:50		Glaucous gull	
6	y330	c330	25.07.2018	15:51	6	Glaucous gull	
7							
8							
9							

METADATA | RESTART TIMES | LOGGER RETUNS | ALLOCATION LIST | List

Please fill in and send us the metadatasheet as soon as possible after the field work has been carried out. Metadatasheets should be sent via email to: vegard.brathen@nina.no or Svenja.Neumann@npolar.no

Should you have any comments or questions regarding the metadata sheet, please do not hesitated to contact us.

Good luck and happy trapping!