

Geolocator and general protocols for 2025

NEW

!!!

New content for 2025 in the protocol is marked with this symbol – please read carefully!



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These protocols are meant to serve as guidelines for field work carried out in cooperation with SEATRACK in 2025. Please distribute them as whole or in part to field teams as you see fit. If any questions, please contact <u>Svenja.Neumann@npolar.no</u> or <u>Vegard.Brathen@nina.no</u>

SEATRACK

This document should be read as a collection of protocols that covers activities within the SEATRACK project. Programming and deploying archival leg-mounted GPS or back-mounted GPS-GSM tags are described in separate protocols. Within this document, 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 encircle the North Atlantic. It was first started in 2014 and the project is now in its third period, lasting until the end of 2026. Visit <u>seatrack.net</u> for more information about the project

This third phase includes 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 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 ~3000 GLS tags and ~350 GPS tags distributed between 87 sites and 16 species. All GLS loggers sent to SEATRACK participants have been started beforehand, while GPS and GPS-GSM must be programmed beforehand.

At the end of the season we ask that partners fill in the <u>metadata sheet</u> and send it to <u>svenja.neumann@npolar.no</u>, and retrieved and unused loggers are returned to:

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

SEATRACK 2025 Software

IMPORTANT: The latest Lotek and Migrate Technology software versions should be installed on your machine. Contact <u>Svenja.Neumann@npolar.no</u> or <u>vegard.brathen@nina.no</u> if you experience problems using the links below.

• NOTE that all GLS loggers sent to SEATRACK participants have been started beforehand.

All relevant software can be downloaded following these links:

For Migrate Technology (UPDATED 2023)

Please contact info@migratetech.co.uk for the latest version of the software.

Lotek (formerly Biotrack and BAStrack)

https://www.lotek.com/support/

Pathtrack

Please see protocols for archival GPS from PathTrack for links to relevant software

SEATRACK 2025 GLS models

Geolocators currently being deployed in SEATRACK

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W015

	mk3006	Lotek	2.5 g	16x14x6 mm	3 – 5 years
2	Light:	Maximum val	ue recorded ever	y 10 minutes	
	Immersion: SST:	State obtained Recorded after min intervals	d every 3 sec, red er 20 min contino until dry > 3 sec.	corded in 10 minu usly wet and there	te bins (0:200). eafter with 20
	mk4083	Lotek	1.9 g	17x10x6.5 mm	3 years
	Light:	Maximum val	ue recorded ever	y 10 minutes.	
	Immersion:	State obtaine	d every 3 sec, reo	corded in 10 minu	te bins (0:200).
	c65 super	Migrate Technology	1 g	14x8x6 mm	1-2 years
	Light:	Clipped range every 5 minut	e, sampled every es.	minute, max value	e recorded
	Light: Immersion:	Clipped range every 5 minut State obtained	e, sampled every es. d every 30 sec. R	minute, max value ecorded in 10 mir	e recorded n bins (0:20)
	Light: Immersion: SST:	Clipped range every 5 minut State obtained Measured cor and mean rec	e, sampled every es. d every 30 sec. R ntinuously after 20 orded every 8 ho	minute, max value Recorded in 10 mir 0 minutes submer urs.	e recorded n bins (0:20) rsion, max, min
	Light: Immersion: SST: w30A9	Clipped range every 5 minut State obtained Measured cor and mean rec Migrate Technology	e, sampled every es. d every 30 sec. R ntinuously after 20 orded every 8 ho 0.45 g	minute, max value Recorded in 10 mir 0 minutes submer ours. 15x5x4 mm	e recorded n bins (0:20) rsion, max, min 1 year
	Light: Immersion: SST: w30A9 Light:	Clipped range every 5 minut State obtained Measured cor and mean rec Migrate Technology Clipped range every 5 minut	e, sampled every es. d every 30 sec. R ntinuously after 20 orded every 8 ho 0.45 g e, sampled every es.	minute, max value Recorded in 10 mir 0 minutes submer ours. 15x5x4 mm minute, max value	e recorded n bins (0:20) rsion, max, min 1 year e recorded
	Light: Immersion: SST: w30A9 Light: Immersion:	Clipped range every 5 minut State obtained Measured cor and mean rec Migrate Technology Clipped range every 5 minut State obtained	e, sampled every es. d every 30 sec. R ntinuously after 20 orded every 8 ho 0.45 g e, sampled every es. d every 30 sec. R	minute, max value ecorded in 10 min 0 minutes submer ours. 15x5x4 mm minute, max value ecorded in 10 min	e recorded n bins (0:20) rsion, max, min 1 year e recorded n bins (0:20)

SEATRACK 2025 Discontinued GLS models

Discontinued geolocator models in SEATRACK



c250	Migrate Technology	2.6 g	17x18x6 mm	5 years
Light:	Clipped range, minutes	sampled every mir	ute, max value reco	orded every 5
Immersion:	State obtained	every 30 sec. Reco	rded in 10 min bins	(0:20)
SST:	Measured cont mean recorded	inuously after 20 n every 4 hours.	ninutes submersion	, max, min and
c330	Migrate Technology	3.4 g	17x19x6 mm	4 years
Light:	Clipped range, minutes	sampled every mir	ute, max value reco	orded every 5
Immersion:	State obtained	every 30 sec. Reco	rded in 10 min bins	(0:20)
SST:	Measured cont mean recorded	inuously after 20 n every 4 hours.	ninutes submersion	, max, min and
mk4093	Lotek	1.5 g	15x10x6 mm	2 years
Light:	Maximum val	ue recorded eve	ry 10 minutes	
Immersion:	State obtaine	d every 3 sec, re	corded in 10 min	ute bins (0:200)
SST:	Does not record	d SST		
C65/w65/ f100	Migrate Technology	1 g	14x8x6 mm	1-2 years
Light:	Clipped range every 5 minut	e, sampled every tes.	minute, max valı	le recorded

Immersion: State obtained every 30 sec. Recorded in 10 min bins (0:20)

SST: Measured continuously after 20 minute submersion, max, min and mean recorded every 8 hours (accuracy considered very low for c65 and w65)

What loggers should be redeployed?

- We recommend reusing GLS loggers of model mk3006 produced in 2023 and 2024, and mk4083 produced in 2024
- See table below for serial number of loggers with enough battery to be redeployed. In colour are serial numbers for loggers that are not recommended to be redeployed in SEATRACK, but which still can hold battery capacity of >6 months.

	Logger ID and production year		
Model	2023	2024	
mk3006	B8324 – B9171	B9247 – B9999 F0000 – F0102	
mk4083	C8226 – C9526	C9602 – C9999 G0000 – G0980	
c65_super	/	CS269 – CS699	

 GPS loggers produced in 2024 can be redeployed, if recharged and programmed according to the 2025 archival GPS protocol. The 2024 model is pictured below, and is very different from the 2023 version:



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

Equipment needed for GLS deployment

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

- Loggers
 - All loggers sent to participants in the project have already been started.
- Interface boxes
 - 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
- Cable tie-pistol
 - For strapping cable ties and snipping loose cable tie-ends
- Amalgating tape
- Super glue
 - A drop of superglue should be placed in the cable tie lock after the lose cable tie end has been cut off.
- 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
 - Callipers
 - Spring balance/scales
 - Bird bags
 - Notebook and pens



Mounting of mk3006 & c330



- 1. Remember to wrap the logger groove (where the cableties will sit) with amalgating tape. DO NOT COVER THE LIGHT SENSOR.
- 2. Place the ring on the bird's tarsus
- 3. Thread two 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 bird's leg.
- 6. Make sure that when you tighten the ties, that the locks fall within the groove and over the opposit cabletie.
- Cut the lose cabletie-ends off by the lock and put a drop of superglue inside the lock.
 - Make sure that the 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.

8.

Note correct position of cabletie locks





GLS-logger deployment

- The geolocator is purely archival; you must recover the instrument in order to get the data. Therefore, logger deployment should mainly be limited to breeding birds which can be trapped again at the same location in another year.
- Amalgating tape increase friction to keep logger and cable ties in place.
- Amalgating tape is very elastic and it is enough to use a piece of half a centimeter width or less. Wrap it tightly around the logger where the cable tie will be. This can be done before heading out trapping and we advise you to do so to minimize handling-time.
- Loggers **<u>should not</u>** be mounted on doubly wrapped rings 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.



Mounting of mk4083 & c65_super



- . Remember to wrap the logger groove (where the cableties will sit) with self amalgamating tape. DO NOT COVER THE LIGHT SENSOR.
- . Place the ring on the bird's tarsus
- Thread a single cable tie through the predrilled holes in the ring. Note that it can be stiff and tight but it still should fit.
- Place logger (with amalgating 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 bird's leg. When mounting the smaller loggers, the terminals
 should be on the lower half of the logger relative to the bird's leg.
- Cut the lose cabletie-end off by the lock and put a drop of superglue inside the lock.
- Check that the 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 loggermount should in no way be attached to the metal ring.

Mounting of w30A9 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)



- 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.
- Instead you should use Loctite super glue ALL PLASTICS which is supplied by us together with the loggers and the rings. <u>https://www.loctite-</u> <u>consumer.co.uk/en/products/super-glueliquid/super_glue_all_plastics.html</u>
- It consists of an activator pen which you apply first and an all plastics super glue which you apply after 60 sec.
- Practise application of glue before going in the field
- 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.
- Also, bring a spare tube in the field.

Loggers



Cable ties or glue only





- Integeo--w30A9-SEA by Migrate Technology for ARTE and LSP.
- 15 x 5 x 4 mm, 0.45 gram
- 12 month battery. We started them (with a delay) just before sending them to you- to maximize the battery life for the deployment period.
- We use **1.6 mm** wide cable tie for ARTE (left)
- We use only glue (all plastic) for LSP (right)

Mounting on Leach's storm petrel (LSP)

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.
- 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]

- Loggers are pre-mounted on the PVC ring attached with 1.6 mm cable tie. Already well glued to the ring.
- 1. 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).
- 2. 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.

- 3. Activator: Apply the activator pen along the opening of the ring
- 4. 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

Loggers are not pre-mounted on the PVC ring



- 1. Ring: Use your fingers and nails to open the ring and wrap/work it around the leg (left picture)
- 2. Thread the 1.6mm cable tie through the holes.
- 3. Activator: Apply activator inside the overlap of the ring.
- 4. GLUE: Apply all plastic super glue inside the overlap of the ring to firmly close the ring.
- 5. Activator: Apply activator on back of the logger and on the ring surface
- 6. GLUE: Apply all plastic super glue on the back of the logger
- 7. Tigthen the cable tie carefully around the logger with the cable tie pistolbut DO NOT AIM to use the pistol to CUT because this cabel tie may easily break.
- 8. Cut the cable tie with another cutter (rigth picture)
- 9. GLUE: Apply all plastic super glue between the logger and the ring
- 10. 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 (see '<u>Field Notes and Metadata</u>'), 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 <u>Vegard.Brathen@nina.no</u> or <u>Svenja.Neumann@npolar.no</u>

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 <u>Svenja.Neumann@npolar.no</u>. 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 <u>not to wipe</u> <u>the memory</u>, 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 <u>page 21</u>).
- Migrate technology loggers need to be turned off to be downloaded, the <u>memory is wiped</u> 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 software from Lotek (Biotrack) and Migrate Technology (page 5).





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. It is important that you make sure that you have the latest versions of the software from Lotek (Biotrack) (page 5).

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 errormessage 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 "?"".



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".

12 Communicate.vi	x
Click 'press' buttons: not keys on the keyboard. If the interface freezes, disconnect then reconnect the interface box. Then click RESTART.	
press 'y' press 'n' start capture EXIT press '?' press space bar press enter EXIT	
To quit, close this window and unplug the interface or to continue, connect a recorder unit (Black clip to pin marked BL or B) ** FOLARITY IS IMPORTANT! ** When recorder is connected type QUESTION MARK(?) for recorder status report.	•
Please wait for prompt ">". Recorder is connected. Just a couple more seconds	Е
Please wait for prompt ">". This recorder is COLLECTING DATA! The timer is Running. The timer value is: 0995D 01H 13M 095	
Do you want to RECEIVE THE DATA (y/n)?>	•
Capturing to ig	

- 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.

Save in:	GreatAuks_Eldey_1843-44			FYIT
C:	Name	Date modified	Туре	- Court
ecent Places Desktop Libraries Computer	No items n	natch your search.	Ţ	3) report.

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.



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.

Click 'press' buttons; not keys on the keyboard. If the interface freezes, disconnect then reconnect the interface box.	Then click RESTART.
press 'y' press 'n' sto press '?' press space bar press enter CAP	EXIT EXIT EXIT EXIT EXIT EXIT EXIT EXIT
TYPE TIME (GMT to nearest min). Use format: hh:mm. >14:38 Please wait for prompt ">".	•
The timer value is: 0995D 01H 18M 12S 05 Å1 22 06 06 08 05 06 02 02 01 02 01 2Å 92 20 24 13 17 16 1D 1C 15 18 25 1F 06 13 0Å 09 0D 09 0B 0B 0E 0F 10 0F 0B 0Å 09 0C 09 0D 12 10 0F 14 12 10 0E 13 14 14 15 18 1B DF 25 21 20 21 1B 16 14 14 14 14 0E 15 18 19 15 10 10 16 15 18 30 1F 1C 18 C1 F 25 92 23 1B 1F 23 25 26 28 99 28 FÅ FC Å1 26 20 20 16 18 24 1E 15 26 1B 25 92 27 92 1D 1C 0E 0Å 14 18 15 0E 0D 0D 0D 0B 07 05 08 0E 0B 06 04 04 08 0Å 0B 0C 0D 15 15 16 12 16 12 0D 16 10 1B 24 27 26 93 1E 1D 1D 1D 1D 1B 1B 1E 1E 1E 92 28 23 22 D6 1C 24 94 1C 1F 14 14 14 14 14 16 0F 15 11 10 12	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

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"

If t	Click 'pre the interface freezes, discon	ss' buttons; not key: nect then reconnect	s on the keyboard. the interface box. Th	en click RESTART.	EVER	
press "	press y press 'n' 2' press space bar	press enter	Stop CAPTUR	RE IS ON	RESTART	
E0 E0 E0 E0 E0 E0 E0 E0 E0 D4 FA FC E0 E0 E0 E0 D4 E0 E0 E0 E0 E0 E0 E0 E0 E0 E0 E0 E0 E0 E0 E0 E0 E0 D4 FA FC E0 E0 E0 E0 E0 E0 E0 E0	You may type a line of the second sec	umber, animal ID, co its - e.g. found dead	priments, etc.) , metalring no	ad file.		•
E0 E0 E0 E0 E0 FA FC E0 E0 E0 E0 E0 D4 FA FC E0 E0 E0 E0 E0 E0 E0 E0 E0 C9 The timer value	EU EU EU EU EU EU EO EO EO EO EO EO D4 FA FC EO EO EO e is: 0995D 01H 44	EU EU D4 FA F EO EO EO EO I EO EO EO EO I M 36S	C EU EU EU EU EO D4 FA FC EO EO EO EO EO D4	EU EU E E0 E0 E0 E0 FA FC E0 E0	64 E0 E0 E0	
	n to one line of te	ext (eq. comme	ents recorder	& animal TD	etc.)	4 III

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""!

😰 Communicate.vi	Communicate vi
EXT Communicate with the interface for each of the keyboard. If the interface for each of the reconnect the interface box. Then click RESTART. press ?? press gace bar for the control of the record RESTART. Do you want to STOP COLLECTING DATA AND SEND THIS RECORDER TO SLEEP (y/n)?>	Click 'press' buttons; not keys on the keyboard. If the interface freezes, disconnect the interface box. Then click RESTART. press 'y' press space bar press enter CAPTING FOODER TO SLEEP (y'n)?>n Please vait for prompt ">". Please vait for prompt ">". Please disconnect recorder.
Capturing to g	Capturing to g

- 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.

In this section the download procedures for GLS loggers produced by Migrate Technologies Ltd.

It is important that you make sure that you have the latest versions of the software from Migrate Technology (v1.15.0, <u>page 5</u>).

The step by step downloading procedures are as follows:

- 1. Plug the Migratetech interface box into 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. When you have connected the logger to the interface select "Stop recording". You will then be presented with a series of windows:





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.

LOGGER IS STOPPED - details of last recording session below	
Migrate Technology Ltd logger Type: 4.44.8, current settings: 0.125'C resolution, +/-0.5'C accuracy. Conductivity >63 for 'wets' count. Lig range 4, ambient. XT. Logger number: M587	ht
MODE: 6 (clipped range light, wet/dry recorded) LIGHT: Sampled every minute with max light recorded every Smins. Light reading saturates (clipped) at 1000 TEMPERATURE: Immersion max, min, mean temperature recorded every 8hrs. Sampled when 20mins contin wet. WET/DRY: Sampled every 30secs with number of samples wet recorded every 10mins. Max record length = 52 months. Total battery life upto 84 months. Logger is currently 24 months old.	0 lux. uous
Programmed: 04/05/2016 14:57:50. Start of logging (DD/MM/YYYY HH:MM:SS): 04/05/2016 14:57:50 Age at start of logging (secs): 61880940, approx 24 months End of logging (DD/MM/YYYY HH:MM:SS): 04/05/2016 15:19:37 Age at end of logging (secs): 61882246, approx 24 months Timer (DDDDD:HH:MM:SS): 00000:00:21:46 Drift (secs): 1. Memory not ful. Pointers: 196,212993,65793,65793,00,0% light mem used,0% wet/dry/temp mem used Tcals (Ax*348x*2+Cx+D): NaN,NaH,NaH,NaH 0.125C resolution, +/0-3C accuracy. Conductivity >63 for 'wets' count. Light range 4, ambient. XT.	

6. Next you will be 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.



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" for a c250 logger retrieved and downloaded in 2019, or "CB476_2021_c65_super" for a c65 super logger retrieved and downloaded in 2021. Since the downloaded data is written to 7 different files, we recommend you create a folder to contain all files from each individual logger.

Offloading logger data	
•	bytes downloaded
Downloading light data - please wait	4

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



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 Migrate Technology logger, please make sure that all files have been downloaded before you start the logger up again.

Image: MS87_2016_c250.deg 04.05.2016 17:25 DEG File Image: MS87_2016_c250.lux 04.05.2016 17:25 LUX File Image: MS87_2016_c250.ral 04.05.2016 17:25 RAL File Image: MS87_2016_c250.rat 04.05.2016 17:25 Rating System File Image: MS87_2016_c250.rat 04.05.2016 17:25 SST File Image: MS87_2016_c250.rat 04.05.2016 17:25 DEG File	
M587_2016_c250.lux 04.05.2016 17:25 LUX File M587_2016_c250.ral 04.05.2016 17:25 RAL File M587_2016_c250.rat 04.05.2016 17:25 Rating System File M587_2016_c250.sst 04.05.2016 17:25 SST File M587_2016_c250.driftadj.deg 04.05.2016 17:25 DEG File	
Image: Missr_2016_c250.ral 04.05.2016 17:25 RAL File Image: Missr_2016_c250.rat 04.05.2016 17:25 Rating System File Image: Missr_2016_c250.sst 04.05.2016 17:25 SST File Image: Missr_2016_c250.driftadj.deg 04.05.2016 17:25 DEG File	
M587_2016_c250.rat 04.05.2016 17:25 Rating System File M587_2016_c250.sst 04.05.2016 17:25 SST File M587_2016_c250driftadj.deg 04.05.2016 17:25 DEG File	
Image: M587_2016_c250.sst 04.05.2016 17:25 SST File Image: M587_2016_c250driftadj.deg 04.05.2016 17:25 DEG File	Select a fil
M587_2016_c250driftadj.deg 04.05.2016 17:25 DEG File	to preview
· · · · · · · · · · · · · · · · · · ·	
M587_2016_c250driftadj.lux 04.05.2016 17:25 LUX File	

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 <u>Mode 6</u> 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

StartLogging.vi		23
WARNING: This	action will DELETE all data in logger	
Select mode for I	Intigeo v2-4,>5notemic	
(6) MODE 6	GetTimeDateUser.vi	
Current light ra Range 4: 1.1-7 Mode details MODE: 6 (clipp LIGHT: Sample (clipped) at 10 TEMPERATURI 20mins contin WET/DRY: Sar Max record length	ENSURE THIS IS THE CORRECT CURRENT TIME AND DATE GMT (UTC) - YOUR DATA WILL BE CORRUPT IF THIS IS INCORRECT Click calendar icon below to change the current time or date (+/-30secs ok) HH:MM:SS DD/MM/YY 14:55:18 04/05/16 Cancel	Make sure that date and time are correct according to GMT. Be sure that you have an accurate clock for comparison.

 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. <u>Note the start date and time (GMT) down in the Metadata-template in the</u> <u>"RESTART TIMES" sheet.</u>

LOGG	ER IS RECORDING DATA
Migra	te Technology Ltd logger
Type	: 4.44.8
Logg	er number: M335
MODE LIGH	E: 6 (clipped range light, wet/dry recorded) T: Sampid every minute with max light recorded every 5mins. Light reading saturates (clipped) at 100 ERATURE: Immersion max, min, mean temperature recorded every 8hrs. Sampled when 20mins
contii	nuous wet.
WET,	/DRY: Sampled every 30secs with number of samples wet recorded every 10mins.
Max r	ecord length = 52 months. Total battery life upto 84 months.
Progr	ammed: 04/05/2016 14:51:14. Start of logging (DD/MM/YYYY HH:MM:SS) 04/05/2016 14:51:14
Age a	at start of logging (secs): 62527878, approx 24 months
Curre	nt PC time (DD/MM/YYYY HH:MM:SS): 04/05/2016 14:51:16
Age r	now (secs): 62527880, approx 24 months
Timer	(DDDDD:HH:MM:SS): 00000:00:00:02
Drift ([secs): 1. Memory not full.
Point	ers: 192,212992,0,0,0,0,0% light mem used,0% wet/dry/temp mem used
Tcals	(Ax^3+Bx^2+Cx+D): NaN,NaN,NaN,NaN,
0.125	°C resolution, +/-0.5'C accuracy. Conductivity >63 for 'wets' count. Light range 4, ambient. XT.

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.

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 **blood** and **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 **strongly** 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 (<u>https://arctox.plumegeo.fr/</u>).
- 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 (<u>jerome.fort@univ-lr.fr</u>) 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.plumegeo.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 <u>Alcid and Larid species</u>
- Juveniles equipped or retrieved with a logger should be sampled

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.

Sampling protocol 2025

Body feathers (All species)

- At least all individuals retrieved with GLS loggers + other birds to reach 20.
- Minimum of 3 <u>belly feathers</u> + 3 <u>back feathers</u> <u>should be collected</u> (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.

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 <u>metadata sheet</u>. 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.

Please include deployment information from GPS-GSM instrumentations.

Our metadata template consists of four excel sheets:

- The metadata sheet (field notes): 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.



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. 'Red(ABB)')

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	– mk15	– mk14
– c65	– mk18	– LAT2500
– c65_super	– mk9	– Other
– w65	– mk13	 nanoFix_GEO_mini
– mk3006	– c330	 picoFix_GEO_mini2
– mk4083	– f100	 picoFix_GEO_mini3
– mk4093	– W30A9-SEA-NOT	

- **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

Sheet 1: Encounter data

Individual information

Register genmandatory, nformation 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)
 Scull





Wing length

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.



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
 breeder
 - breeding/stage_unknown

prebreeding

failed breeder

- incubating
- rearing chicks
- 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 30d
 - 15d
 - 20d

fledging
none

- 25d

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).

NEW

- nest_id, [Optional]. Nest identification, if registered can be entered in this column, as noted by participants.
- nest_latitude, [recomended for GPS]. Fixed format, decimal degrees, positive values for longitude east of Greenwich and negative values for west (e.g. 15.4967).
- **nest_longitude**, [recomended for GPS]. Fixed format, decimal degrees, positive values for longitude east of Greenwich and negative values for west (e.g. 15.4967).

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.

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 bird's 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.



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

- mk15 – mk18
- c65_super
- w65
- mk3006
- mk4083
- mk4093
- W30A9-SEA-NOT

– mk9

- mk13

- c330

- f100

- 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
- Stored_or_sent_to?
 - sent to Tromsø
 - sent to another location
 - shutdown and stored at location
 - other
- comment

	Α	В	С	D	E	F	G		
1	LOGGER RETURNS								
2	logger_id	logger_model	downloaded by	download / stop_date	status	stored or sent to?	comment		
3	c554	mk4083	Ole Lomvi	25.07.2018	Successfully downloaded	sent to Tromsø			
4	c552	mk4083	Ole Lomvi	25.07.2018	Successfully downloaded	sent to Tromsø			
5	c555	mk4083	Ole Lomvi	26.07.2018	Downloaded with an error message	sent to Tromsø	Data appear fine, still sent to Tromsø		
6	c569	mk4083	Ole Lomvi		Nonresponsive	sent to Tromsø			
7	c571	mk4083	Ole Lomvi	26.07.2018	Successfully downloaded	other	Logger lost after it was downloaded		
8	c1272	mk3006			No download attemted	sent to Tromsø	Retrieved last day in field, no time to download		
9	c1270	mk3006			No download attemted	▼ nt to Tromsø	Retrieved last day in field, no time to download		
10					Successfully downloaded	^			
11					Nonresponsive No download attemted				
12					Downloaded with an error message				
13					Lost				
14									
15						~			
16					ATION LIST List				
4		IVIETADATA RES		ALLOC		i 4			
REAL	FADY								

- mk14
- LAT2500
- Other
- nanoFix_GEO_mini
- picoFix_GEO_mini2
- picoFix_GEO_mini3
- No download attempted

Lost

- Downloaded with an error message

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, select the appropriate model from the predefined options on the dropdown list:
 - c250

– mk15 - mk18

– c65 - c65 super

- w65

- mk9
 - mk13
 - c330
 - f100

- picoFix_GEO_mini2
 - picoFix_GEO_mini3

- nanoFix_GEO_mini

- Startdate_GMT, register the date (GMT) when the logger has been started ٠
- 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

	А	В	С	D	E	F	G	
1				RESTART TIME	S			
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 v	v
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								
	< > N	IETADATA R	ESTART TIMES	LOGGER RETU	NS ALLO	CATION LIST	.ist	

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.

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- mk14
- Other
- LAT2500

- - - - W30A9-SEA-NOT
- mk3006 - mk4083 - mk4093

Good luck and happy trapping!

