



SEATRACK
Seabird Tracking

GPS-GSM protocol for 2025

Important information on GPS-GSM transmitters !!!

NEW!!!

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



Table of content

Protocols	Pages
General information	1
GSM subscription and data fees	2
GPS-GSM transmitter model	3
Precautions	4
Turning the device on and off	5
Initial test of the device	6-8
Transmitter settings	
Background	9-10
Device settings	11-12
Seasonal changes	13
Start with summer settings	14
Species-specific settings	
Lesser black-backed gull	15
Herring gull	16
Glaucous gull	17
Important notes on transmitter settings	18-20
Deploying GPS-GSM transmitters	21
Field notes and Metadata	22

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 arise, please contact Svenja.Neumann@npolar.no .

General information

This document contains the most important information about the GPS-GSM transmitters for deployment on large gulls as part of SEATRACK. The protocol is based on advice from Ornitela and previous experience of SEATRACK partners. For detailed instructions, please consult the Ornitela user manual.

This year, we aim to deploy a total of 55 devices on Lesser-black-backed gulls, Herring gulls and Glaucous gulls.



GPS-GSM transmitters which were not deployed should be fully charged (battery level 100%), turned off (on magnetic pad) and sent back to:

**Norsk Polarinstitutt
Att: Svenja Neumann
Post box 6606 Stakkevollan
N-9296 Tromsø
NORWAY**

GSM subscription and data fees

GSM service subscription and actual data transfer costs are paid for by SEATRACK.

IMPORTANT: Please notify us (providing serial number) in the following situations:

1. The transmitter is not deployed in the 2025 season.

In this case SEATRACK will contact Ornitela and temporarily suspend the GSM service subscription. The account will be reactivated the next field season.

2. The transmitter has stopped working permanently.

In this case SEATRACK will contact Ornitela and permanently terminate the GSM subscription and service fees. Please consider carefully if the transmitter stopped functioning permanently or if sending positions is temporarily suspended. Transmitters may stop sending data for extended periods of time, for example when a bird migrates to an area without GSM coverage and stays there for months, or when battery discharges during poor light conditions (e.g. winter at high latitudes). The transmitter will start sending data again when the bird enters an area with GSM coverage and/or light conditions improve. If GSM subscription is terminated, it cannot be reactivated.

GPS-GSM transmitter model



**OrniTrack-15 - solar
powered GPS-GSM/GPRS
tracker on magnetic pad**

Included:

- Ornitrack-15 transmitter on magnetic pad
- Aluminium clamps (8x)
- Light foam pad to place under the device (2x)
- 6.35 mm Teflon band
- 6.35 mm Spectra band

NEW!!!

NEW: We provide white natural tubular Spectra tape as an alternative to Teflon (as discussed during the GPS-GSM workshop in November 2024). Partners are free to choose which band they prefer to use.

Foam pad, Teflon band, Spectra band and aluminum clamps



Precautions

- Make sure the transmitter does not overheat (*i.e.* temperature should not exceed 50°C).
 - For example, do not keep transmitters in direct sunlight on the car dashboard and avoid sudden temperature changes.
- Do not place the device next to strong magnetic fields.
- Do not drop or disassemble the device.
- Do not turn on and use the transmitter in areas with poor GPS conditions (e.g. indoors), this may lead to rapid battery depletion.



Photo: Roos Kentie & Kees Camphuijsen

Turning the device on and off

The transmitters are supplied turned off and charged (above 90% battery charge). The device is equipped with a magnetic switch.

Start up :

- The transmitter will be turned on once it is taken out of the special holding pad that contains a built-in magnet (see figure on previous page).
- After removing the transmitter, you will see a flashing red LED:



The red LED flashes several times and at a slow rate: correct start-up of the transmitter.



The red LED flashes briefly and at a high rate : complete discharge of the battery.

Shut down:

- When the transmitter is placed back into the holding pad, the LED will light-up once, indicating that the transmitter was successfully turned off.



Initial test of the device

To verify correct operation of the unit the device is supplied with pre-defined GPS and GSM test settings (GPS fix interval – 900 s, data transmission interval – 14400 s).

Please test the device as follows:

- 1) Remove the transmitter from the holding pad and place it on a level surface in an outdoor area with an open sky view and good GSM coverage.
- 2) With the pre-defined settings, the standard test should last a little over 4 hours.
- 3) After a 4+ hour test period, re-insert the transmitter into the magnetic holding pad and the transmitter will turn off.
- 4) Access the online control panel for the transmitters here: <https://cpanel.glosendas.net/>.



Photo: Svenja Neumann

Initial test of the device

- 5) Enter your username and password (will be send out via mail), which will take you to the OrniTrack devices main page:

The screenshot shows the OrniTrack Control Panel interface. At the top, there's a header with the Ornitela logo and 'OrniTrack Control Panel'. Below this, a welcome message for 'SEATRACK' is displayed along with links for 'Financial', 'Settings', and 'Logout'. A green banner indicates the data transfer fee balance for the account 'seatrack' on 2024-02-29 was 0 Eur.

Below the banner, there's a section for device management with 'Select' and 'Deselect' buttons, a 'Show 25 devices per page' dropdown, and a search bar. A table lists devices with columns: Name, S/N, Status, Last GPRS data, Next GPRS data, and Device notes. The table shows five devices, all with status '100' and last GPRS data from 2024-04-15 14:38:38.

Below the table, there's a section for device details for 'OT-15 4G' (S/N: 243334, Model: OT-15-4GEC, FW: 2006231010). It displays the last data received by GPRS (2024-04-18 15:48:58 UTC+3), next data session expected (2024-04-26 15:48:58 UTC+3), battery status (100% (416mV)), settings pending for transmission (0), and data bytes in memory before last data session (0 bytes).

There's a 'Download data (UTC yyyy-mm-dd hh:mm)' section with a date range from 2024-04-19 00:00 to 2024-04-26 11:35. Below this, there are buttons for 'GPRS+ALT', 'GPS+SENSORS', 'KML', 'KMZ', 'CSV', 'SMS', 'GPX', and 'Device settings'. A 'Data subscription options' section shows the current status as 'Active'.

On the right side, there's a map showing the location of the device, labeled 'Europos geografinis centras'. The map includes a 'Satellite' view button and a 'Track length' dropdown set to '500 points'.

At the bottom, there's a 'Show all devices' dropdown and a 'on map, 55 of 55 devices' indicator.

- 6) On the OrniTrack devices main page, you will see that the tested transmitter has transferred the acquired data (under last GPRS data)

This screenshot is a close-up of the device list table from the OrniTrack Control Panel. The table has columns: Name, S/N, Status, Last GPRS data, Next GPRS data, and Device notes. The 'Last GPRS data' column is highlighted with a red box, showing the following values for the five devices:

Name	S/N	Status	Last GPRS data	Next GPRS data	Device notes
OT-15-4G	243334	100	2024-04-15 14:38:38	2024-04-26 14:38:38	
OT-15-4G	243335	100	2024-04-15 14:38:38	2024-04-26 14:38:38	
OT-15-4G	243336	100	2024-04-15 14:38:26	2024-04-26 14:38:26	
OT-15-4G	243337	100	2024-04-15 14:38:31	2024-04-26 14:38:31	
OT-15-4G	243338	100	2024-04-15 14:38:39	2024-04-26 14:38:39	

Below the table, there's a 'Showing 51 to 55 of 55 devices' indicator and pagination links for 'Previous', '1', '2', '3', and 'Next'.

Initial test of the device

- 7) If the device continues to connect to the GSM network (as seen from the timestamp of the "Last GPRS data" on the main page of the OrniTrack Control Panel) this may indicate incorrect placement of the transmitter into the holding pad.

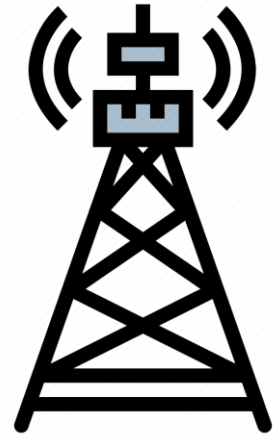


Important:

- Before deployment, GPS and GSM settings should be changed to the **recommended species-specific settings** as the pre-programmed test-settings are rather intense and will drain battery power.
- Information on how to adjust the GPS and GSM settings is provided on the following pages.

Transmitter settings: background

- Under optimal GPS conditions and a GSM schedule of one data upload per day, a fully charged OrniTrack-15 can record ca. 800 GPS positions.
- Connection to the GSM network and data upload is energetically expensive.
- Therefore, the GSM module is turned off most of the time and activated only at predefined intervals, when it searches for a network, connects, receives pending new settings and uploads the collected data.
- If no network is available, the GSM module switches off after a timeout until the next scheduled connection attempt.
- Battery consumption of a single GSM session is equal to logging approximately 25 GPS positions, depending on GSM signal strength and the amount of data uploaded.



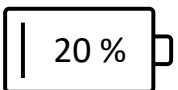
Transmitter settings: background



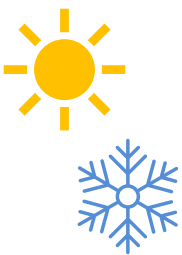
To prevent excessive battery discharge, GPS position logging is discontinued when the battery is depleted.



However, the battery retains a certain energy reserve, used for data transmission and basic functioning of the device until it is recharged by the solar panel.




It is recommended to always maintain battery charge above 20%. This is done by managing device settings considering light conditions (e.g. polar night) and GSM coverage (e.g. poor GSM coverage far out at sea).



Different settings are needed in summer and winter for migrating birds.

Transmitter settings: device settings

Based on previous experience and advice from Ornitela we recommend species-specific minimum settings. These settings can be entered in the **device settings page**, which is accessed by clicking the 'Device settings' button on the main page of the online control panel.



OrniTrack Control Panel

Welcome, SI

Your data transfer fee balance for the account 'seatrack' on 2024-02-29

Select Deselect Show devices per page

<input type="checkbox"/>	Name	S/N		Status	Last GPRS data	Next
<input type="checkbox"/>	OT-15-4G	243334	100		2024-04-15 14:38:38	2024-04-16 14:38:38
<input type="checkbox"/>	OT-15-4G	243335	100		2024-04-15 14:38:38	2024-04-16 14:38:38
<input type="checkbox"/>	OT-15-4G	243336	100		2024-04-15 14:38:26	2024-04-16 14:38:26
<input type="checkbox"/>	OT-15-4G	243337	100		2024-04-15 14:38:31	2024-04-16 14:38:31
<input type="checkbox"/>	OT-15-4G	243338	100		2024-04-15 14:38:39	2024-04-16 14:38:39

Showing 51 to 55 of 55 devices

Previous 1 2 **3** Next

Name: OT-15 4G
S/N: 243284, Model: OT-15-4GEC, FW: 2006231010

Last data received by GPRS: 2024-04-18 15:48:58 (UTC+3)
Next data session expected: 2024-04-26 15:48:58 (UTC+3)
Battery status: 100% (4167mV)
Settings pending for transmission to device: 0
Data bytes in memory before last data session: 0 bytes

Download data (UTC yyyy-mm-dd hh:mm)

From to

Device settings **Graphs**

Data subscription options (Current data subscription status:Active)

Track length:

Satellite

Europos geografinis centras

Google Keyboard shortcuts Map Data 20 m Terms Report a map error



Show on map, 55 of 55 devices

Access the online control panel from the Ornitela website or go directly to:

<https://cpanel.glosendas.net/>.

Transmitter settings: device settings

On the following pages you will find the species-specific transmitter settings that SEATRACK recommends.

OrniTrack Control Panel - Device Settings

Welcome, SEATRACK

Financial

Settings

Logout

Return to main page

Save settings

Cancel all waiting settings

Name: OT-15 4G, sn: 243286, fw: 2006231010

0 settings waiting for transmission to device

Device name

OT-15 4G

Copy settings

Copy settings from selected device

243284 OT-15 4G

Copy settings

Setting	Out of zones	Geofence zone 1	Geofence zone 2
GSM data session interval 600..2073600 seconds	14400	0	0
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	900	0	0
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	0	0	0
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	0	0	0
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	0	0	0
GPS sleep interval 0..21600 seconds	0	0	0
Enable GPS sleep 0 - disabled, 1 - enabled	Disabled	Disabled	Disabled
GPS sleep from dusk -18..18 - sun angle	0° (UTC 18:04)	0° (UTC 18:04)	0° (UTC 18:04)
GPS sleep till dawn -18..18 - sun angle	0° (UTC 02:28)	0° (UTC 02:28)	0° (UTC 02:28)

IMPORTANT:

Please use Chrome or Edge browsers to manage transmitter settings. The device settings page does not work in Firefox.

See next pages

NOTE: Only the out of zones column needs to be updated (not geofence options)

Transmitter settings: seasonal changes

Seasonal changes in device settings:

- Due to varying light conditions, most species need different summer and winter settings.
- Seasonal settings must be set manually by changing values in the online control panel (Please see species-specific settings on the next pages).



Winter



Summer

NEW!!!

! IMPORTANT: We will change your devices to winter settings (and back to summer settings) on the given dates. !

Transmitter settings: start with summer settings

**Before deployment, please program
your devices with summer settings.**



Setting	Out of zones
GSM data session interval 600..2073600 seconds	<input type="text" value="604800"/>
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	<input type="text" value="43200"/>
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>

- Note that it is not necessary to repeat a value if the GPS interval remains the same for different battery charge levels. A value of zero means that GPS logging interval remains unchanged. This way there are fewer settings to send to a transmitter when it connects to the GSM network, which gives less room for error.
- After entering the settings in the online control panel and before going into the field, make sure that the transmitter has **accepted the new settings**. This is done by turning the device on and off using the magnetic pad.



Lesser black-backed gull

IMPORTANT: We will change your devices to winter settings (and back to summer settings).

SUMMER : 1 March – 30 August

Setting	Out of zones
GSM data session interval 600..2073600 seconds	<input type="text" value="21600"/>
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	<input type="text" value="900"/>
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	<input type="text" value="7200"/>
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	<input type="text" value="14400"/>

WINTER: 1 September – 28 February

Setting	Out of zones
GSM data session interval 600..2073600 seconds	<input type="text" value="86400"/>
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	<input type="text" value="900"/>
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	<input type="text" value="7200"/>
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	<input type="text" value="14400"/>



Herring gull

IMPORTANT: We will change your devices to winter settings (and back to summer settings).

SUMMER: 1 March – 30 August

Setting	Out of zones
GSM data session interval 600..2073600 seconds	<input type="text" value="86400"/>
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	<input type="text" value="900"/>
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	<input type="text" value="7200"/>
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	<input type="text" value="14400"/>

WINTER: 1 September – 28 February

Setting	Out of zones
GSM data session interval 600..2073600 seconds	<input type="text" value="604800"/>
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	<input type="text" value="14400"/>
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	<input type="text" value="43200"/>
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>



Glaucous gull

IMPORTANT: We will change your devices to winter settings (and back to summer settings).

SUMMER: 1 March – 14 August

Setting	Out of zones
GSM data session interval 600..2073600 seconds	<input type="text" value="86400"/>
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	<input type="text" value="900"/>
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	<input type="text" value="7200"/>
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	<input type="text" value="14400"/>

WINTER: 15 August – 28 February

Setting	Out of zones
GSM data session interval 600..2073600 seconds	<input type="text" value="604800"/>
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	<input type="text" value="43200"/>
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>

Important notes on transmitter settings

- SEATRACK partners have their individual user accounts, while the project group can see all devices via a master account. The master account is used to change device settings from summer to winter settings (and vice versa). To make this easier, **please add species and deployment site in the device notes on the OrniTrack Control Panel.**

NEW!!!

OrniTrack Control Panel

Welcome, SEATRACK [Financial](#) [Settings](#) [Logout](#)

Your data transfer fee balance for the account 'seatrack' on 2024-02-29 was 0 Eur.

Select Deselect Show devices per page Search:

<input type="checkbox"/>	Name	S/N	Status	Last GPRS data	Next GPRS data	Device notes
<input type="checkbox"/>	OT-15-4G	243309	30	2025-01-10 19:28:58	2025-03-28 19:28:58	Glaucaous gull. Melrakkaev

Name: OT-15 4G
S/N: 243284, Model: OT-15-4GEC, FW: 2006231010

Track length:

Last data received by GPRS: 2024-04-18 15:48:58 (UTC+3)
Next data session expected: 2024-04-26 15:48:58 (UTC+3)
Battery status: 100% (4167mV)
Settings pending for transmission to device: 0
Data bytes in memory before last data session: 0 bytes

Download data (UTC yyyy-mm-dd hh:mm)

From to


GPRS+ALT

Data subscription options (Current data subscription status: Active)

Satellite

Google Keyboard shortcuts Map Data 20 m Terms Report a map error

Important notes on transmitter settings

Return to main page			
Save settings Cancel all waiting settings			
Name: OT-15-4G, sn: 243309, fw: 2006240707		0 settings waiting for transmission to device	
Device name Max 32 characters		<input type="text" value="OT-15-4G"/>	
Copy settings			
Copy settings from selected device		<input type="text" value="243284 OT-15 4G / 1"/> Copy settings	
Setting	Out of zones	Geofence zone 1	Geofence zone 2
GSM data session interval 600..2073600 seconds	<input type="text" value="604800"/>	<input type="text" value="86400"/>	<input type="text" value="86400"/>
GPS fix interval 0..172800 seconds, 0 - invalid value in GF1 and GF2 zones	<input type="text" value="43200"/>	<input type="text" value="900"/>	<input type="text" value="900"/>
GPS fix interval when battery less than 75% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
GPS fix interval when battery less than 50% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
GPS fix interval when battery less than 25% 0 - setting disabled, 1..172800 seconds	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Enable GPS sleep 0 - disabled, 1 - enabled	<input type="text" value="Disabled"/>	<input type="text" value="Disabled"/>	<input type="text" value="Disabled"/>
GPS sleep from dusk -18..18 - sun angle	<input type="text" value="0° (UTC 19:54)"/>	<input type="text" value="0° (UTC 19:54)"/>	<input type="text" value="0° (UTC 19:54)"/>
GPS sleep till dawn -18..18 - sun angle	<input type="text" value="0° (UTC 07:29)"/>	<input type="text" value="0° (UTC 07:29)"/>	<input type="text" value="0° (UTC 07:29)"/>
GPS fix interval during sleep 0..21600 seconds	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
GPS burst 0..600 - seconds	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
Disable GPS burst when battery less than x% 10..90 %	<input type="text" value="50"/>	<input type="text" value="50"/>	<input type="text" value="50"/>
Battery saver If enabled, battery will charge until 80% to increase it's lifespan	<input type="text" value="Disabled"/>		
Geofence zone 2 configuration			
Rect. 1 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 2 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 3 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 4 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 5 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 6 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 7 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 8 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 9 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
Rect. 10 lat/lon top-left: <input type="text" value="0"/> <input type="text" value="0"/> bot-right: <input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="Disabled"/>			
<input type="text" value="Lat:"/> <input type="text" value="Lon:"/>			
			
Save settings Cancel all waiting settings			
Return to main page			
Device notes			
Glaucous gull, Melrakkeay			
Save notes			

Please add here:

- **Species**
- **Deployment site**
- **Bird ID**

NEW!!!

Important notes on transmitter settings

- SEATRACK partners are free to adapt the summer settings to their own interests as long as the **minimum summer settings** are taken care of.
- We are planning to evaluate the results of the winter settings and their performance. We get back to you, if the settings recommended in this protocol should be changed.
- We don't recommend logging GPS positions in bursts or logging sensor data at higher frequencies independently from GPS position fixing. This will fill up the transmitter memory fast and quickly drain battery power.

- **Please do not push the transmitters too hard towards the end of summer.**



- It is important that the battery is well charged at the start of winter, especially for species wintering in areas with limited solar recharge.

Please get in touch with Svenja Neumann if you wish to discuss device settings (Svenja.neumann@npolar.no).

Deploying GPS-GSM transmitters

IMPORTANT:

- SEATRACK partners should ensure that device attachment is safe and secure without harmful effects on the birds.
- SEATRACK partners are encouraged to seek advice from each other concerning attachment techniques.
- **Transmitters should be fully charged prior to their deployment on birds.**



Photo: Mads Bjarke Salling

For more information on harness technique see the papers below or consult individual SEATRACK partners.

Thaxter, C. B., Ross-Smith, V. H., Clark, J. A., Clark, N. A., Conway, G. J., Marsh, M., Leat, E. H. and Burton, N. H. K. (2014). A trial of three harness attachment methods and their suitability for long-term use on lesser black-backed gulls and great skuas. *Ringling & Migration* 29: 65–76. Doi: 10.1080/03078698.2014.995546.

Clewley, G. D., Clark, N. A., Thaxter, C. B., Green, R. M., Scragg, E. S and Burton, N. H. K. (2021). Development of a weak-link wing harness for use on large gulls (*Laridae*): methodology, evaluation and recommendations. *Seabird* 33: 17-22.

NEW!!!

Reminder:

Please fill in the metadata sheet in the same way as for the other devices, i.e., GLS and GPS.

If you are in doubt how to fill a column, please have a look at the last pages of the GLS field protocol under “field notes and metadata”.