



November 2019

GPS TELEMETRY

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## News in 2018/2019

### Milestones:

- almost unlimited & low cost data transfer via GPRS/3G;
- over-the-air (OTA) automatic firmware upgrade via 3G link;
- detailed daily activity reports based on acceleration sensor.

### New models available:

- TRINGA GPS-GSM ~9 g miniature bird tracker;
- CREX GPS-GSM-UHF/GPRS, small and lightweight 14 g;
- CREX-XS GPS-GSM-UHF/GPRS, miniature 11 g version;
- URIA GPS-UHF and CREX loggers with a TDR and improved diving duration recorder;
- bird leg rings, GPS-GSM or GPS-GSM-UHF/GPRS, from 15g;
- ultra-long range base station P6 with ~70% longer downloading ranges;
- miniature XS-UR base station for the drone application;
- miniature XS-NS, short range base station for data download in a single nests o roosts;
- miniature ~from 3 g TDR & diving duration loggers with a remote data download.

### New features and changes:

All the GPS-GSM, GPS-UHF-GSM and long range GPS-UHF bird trackers and mammal collars have got new hardware and the firmware:

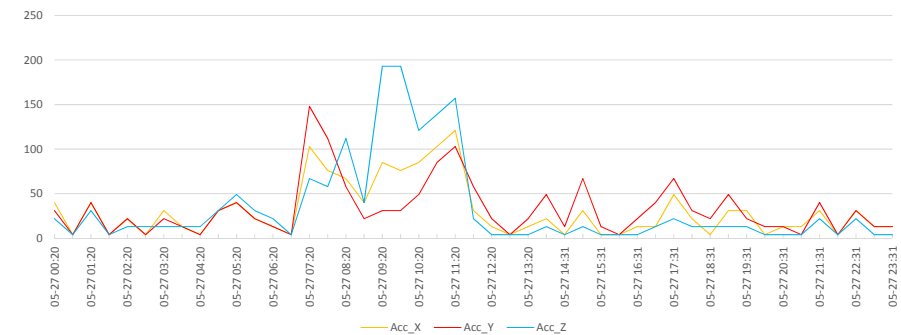
- better power management and lower power consumption;
- barometric sensor or temperature and depth recorder (TDR) available for all models;
- all loggers use 2G/3G quad band HSPA/GSM worldwide & US modems;
- data download alternatively via 2G/3G GPRS to FTP server;
- memory increased to 2 GB (no real limits for the recorded data);
- accelerometer and precise temperature sensor have been added to all models;
- optional built-in VHF beacon with an automatic modes enabling mortality detection.

### New functions :

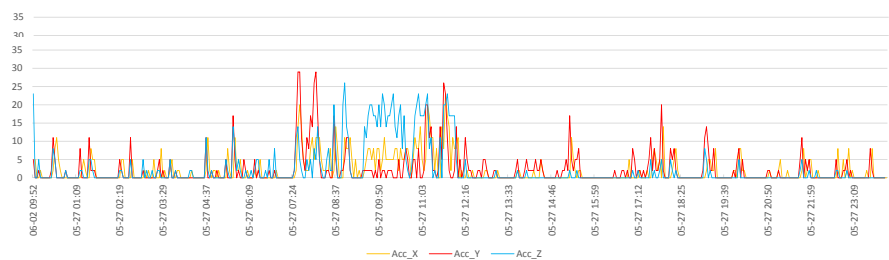
- GPS can be controlled by the acceleration sensor - logger records positions only when animal is moving. This feature allows to track movements with better resolution and save energy when object do not move;
- all loggers are equipped with acceleration sensor and can collect raw acceleration data recorded in programmable (1-30 Hz ) bursts as well record precise daily activity reports;
- the daily “activity report 48” for the GPS-GSM system comes once a day in one SMS. Each record consists of an amount of recorded movements, sampled every 4 seconds and summarised separately for the X, Y, Z axis; It includes 3x48 records collected every 30 minutes.;
- the “activity report 480” for the GPS-UHF-GPRS have much better resolution, records are collected every 3 minutes and consists of an amount of recorded movements, sampled every 4 seconds and summarised separately for the X, Y, Z axis (3x480 records daily).

The graphs below show one day of activity data of the same culture individual, recorded simultaneously with the use of three different methods.

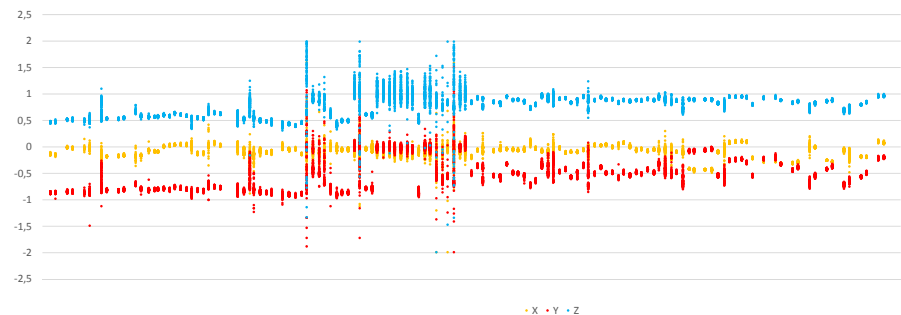
● Activity report 48 (48 points/day x 3 axis)



● Activity report 480 (480 points/day x 3 axis)



● Acceleration raw data recorded in bursts



## GPS trackers with multi-channel data transmission

The most advanced & multifunctional of our GPS loggers for worldwide, all-year-round & fine resolution animal tracking. Except GPS tracks, they can collect precise activity reports, raw acceleration data recorded in bursts, diving depth profiles, barometric pressure, temperature, immersion duration and more. Data collection is divided into **separate GPS-SMS and GPS-GPRS/UHF data banks**, which are individually programmable and with different data **transmission methods** for each of them.

### Available data transmission methods:

- **GPS-SMS:** Present in all trackers with GSM modem. Transmits only data collected in the **GPS-SMS bank**. Enables data transfer and settings change in places where even very weak 2G or 3G GSM signal is present. Data collected in GPS-SMS data bank: GPS position, activity, temperature, battery voltage, GSM signal strength, logger operating parameters & activity report “report 48” send in one SMS daily. Optionally: GPS altitude, speed, barometric pressure & light intensity. Due to a high energy use for transmission and GSM charges, collection of 4-12 GPS positions/day is recommended, however if necessary - up to 1440 GPS positions/day are possible.
- **GPS-GPRS:** Present in all trackers with GSM modem. Transmits only data collected in **GPS-GPRS/UHF bank**. The GPS-GPRS/UHF part uses less energy for data transmission and allows to collect many more fixes than with the GPS-SMS. This communication method allows transmission of almost unlimited data quantities, including acceleration and TDR data. Data collected in GPS-GPRS/UHF data bank: GPS position, speed, GPS altitude, GPS precision parameters, GPS heading, battery voltage, logger operating parameters, barometric pressure or hydrostatic pressure, temperature and immersion duration, acceleration, 3-axis data recorded in a programmable bursts (1-30 Hz) and detailed activity report “report 480”.
- **GPS-UHF:** optional UHF long range link (LRD) to all GPS-GSM trackers or as a default in only GPS-UHF models. The same data from **GPS-GPRS/UHF bank** can be transmitted via optional UHF long range link to the to field installed base station. This transmission consumes low power, at the same time avoiding charges for data. Recommended for places where SMS and GPRS transmission is not possible. Transmission range in the line of sight: ground-to-ground ~800m, ground-to-air or air-to-ground >6km;

### Available data transmission combinations:

- SMS-GPRS
- SMS-GPRS+UHF
- UHF

### Key features:

- independently programmable GPS-SMS and GPS-GPRS/UHF modules;
- worldwide & USA 2G/3G quad band HSPA/GSM communication range;
- data access & programming from password protected web profile or via long range (LR) UHF link;
- programmable data delivery schedules;
- GPS-SMS and GPS-GPRS/UHF intervals: user programmable, from 1 minute to 24 hours;
- GPS controlled by: operating-hours schedule, light sensor (day/night), immersion or acceleration sensor;
- data export to MOVEBANK from GPS-SMS bank;
- long-life rechargeable battery;
- highly efficient solar charger, works as well in a low light conditions;
- 2 GB memory capacity.

### Optional:

- UHF long range (LRD) link to hand operated or field installed base station. Designed for automatic data download and settings change;
- VHF beacon 146-152 MHz, programmable remotely, with an automatic mode enabling mortality detection;
- diving depth & temperature sensor (TDR), diving duration sensor & pressure-proof design;
- barometric pressure & temperature sensor;
- ready for wind farm monitoring (WFM) system;
- double powering system (main - not rechargeable and solar rechargeable battery);
- implementation of ARGOS data download in places where GSM or UHF cannot be used (in progress).

### Functions:

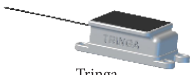
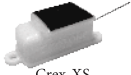

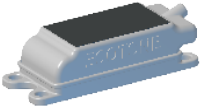
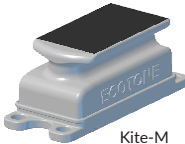
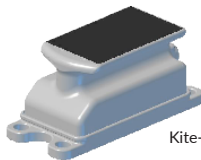
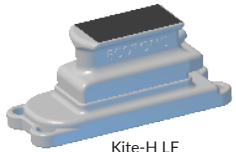
- “No GPS signal”- detects when GPS signal is not present and stops searching in a den, cave, etc.;
- UHF signal from base station can stop GPS data collection, protects battery in a burrow, den or when animal is in the nest;\*
- UHF digital telemetry. It has ~50% bigger range than UHF communication link. Enables easier animal locating as well as improves data download.\*

\* Only when optional built-in UHF transceiver is present.

## Housings choice for GPS-GSM-GPRS/UHF & GPS-UHF LRD trackers:

### Backpack series.

For tracking almost all bird species which accept harness attachment, with body mass >400g.

LOGGER MODEL	Dimensions LxWxH [mm]**	Logger weight *** [g]	For body weight from:	Description	Recommended for:
Backpacks with solar charger.					
TRINGA	27x20x12	9,9	~300g	only external antenna, small solar charger & battery	falcons, waders, gulls
CREX-XS	36x25x19	12	~400g	only external antenna, small solar charger & battery	falcons, waders, gulls
CREX	40x25x19	14	~480g	only external antenna	falcons, big waders, gulls
 Tringa  Crex-XS  Crex					
KITE-L	58x27x18	17	~570g	low profile housing	birds with thin plumage and short feathers which will not cover solar charger on a low profile housing, e.g. falcons, hawks, big waders, gulls, raven
KITE-M*	58x27x24	19	~640g	elevated solar charger	birds with thicker plumage which may cover solar charger on a low profile housing, e.g. buzzards, black grouse, pheasants, not diving small and medium ducks
KITE-H*	58x27x28	20	~680g	elevated solar charger	birds with thick plumage and long feathers, e.g. eagles, non-diving ducks of mallard size, big capercaillie, storks
KITE-H*LF	79x36x36	28	~1000g	elevated solar charger, additional base plate with neoprene pad inside	birds with thick plumage and long feathers, e.g. big eagles, swans
 Kite-L  Kite-M  Kite-H  Kite-H LF					
GRIFFON 2S LF	81x37x38	~36	~1000g	strong housing with glass-reinforced solar charger	species which can easily damage the tracker's housing, e.g. vultures
GRIFFON*	58x27x28	~24	~1000g	strong housing with glass-reinforced solar charger	species which can easily damage the tracker's housing, e.g. vultures

All housings are waterproof up to ~3 m depth.

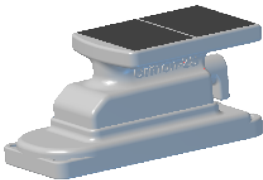
\*Elevated Solar Charger (ESC), housing shape prevents solar charger from shading by the feathers. (Ecotone registered design).

\*\*Dimensions without harness loops or external antennas.

\*\*\*The above weights are calculated for the GPS-GSM & GPS-GSM-UHF models, for the GPS-UHF subtract ~4g.

Recommended for eagles and vultures

GRIFFON 2S LF  
GPS-GSM-GPRS/UHF



Successfully working in project “Energy landscape and bird conservation: movements of griffon vultures and wind-farm development”. Each logger collects daily over 125.000 data records. Works with 1minute GPS interval, raw acceleration 5Hz/25s bursts every 1 minute, barometric pressure to each GPS position, precise “activity report 480”, daily data delivery via GPRS/3G.

Necklaces, leg bands & wing tags.

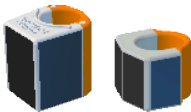
Necklaces are designed for tracking geese, ibises, swans and similar species. Fast and easy locking system without any screws or tools. Leg bands and wing tags can be used on some, usually big bird species, e.g. eagles, big vultures, cranes.

LOGGER MODEL	Dimen- sions LxWxH [mm]**	Logger weight [g]***	Description	Recommended for:
IBIS	ø 35-80	30	The height can be fitted to the species/ user requirements	geese, ibises, swans and similar species.
Leg band	ø >30	25	Designed according to the user specifi- cation. We do prepare leg bands with the GPS tracker or trackers ready for mounting on customer's bands	some vulture or eagle species, long leg birds, e.g. cranes, storks, flamingos
Wing tag	n.a.	18	Based on a low profile trackers attached to the customer's wing tag plates or wing tags designed and manufactured in accordance with the user specification	any big bird species, where wing tags can be used
TURTLE	58x27x28	48	Lithium battery for ~1500 GPS-GSM or ~20000 GPS-UHF positions****	for aquatic turtles, including species hibernating over the winter time

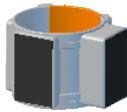
All housings are waterproof up to ~3 m depth.  
\*\*Dimensions without harness loops or external antennas.  
\*\*\*The above weights are calculated for the GPS-GSM  
& GPS-GSM-UHF models, for the GPS-UHF subtract ~4g.  
\*\*\*\*Calculated for conditions with good quality of the GSM & GPS signal.



Ibis collar



Leg bands



Branta collar



Wing tag



**Collars & ear tags for mammals.**

Remote programming and data download. Some models can be equipped with a drop-off system. Strong and comfortable belts, waterproof housings, well designed shape and size, individually adapted to the project requirements.

LOGGER MODEL	Diameter from [mm]	Weight from [g] ***	GPS positions without battery charging ****	Description	Recommended for:
FELIS	50	~80	1 200 GSM 17 000 UHF	solar charger on top of the collar	cats, small primates
FOX	60	120	4 200 GSM 60 000 UHF	single solar charger on top of the collar	foxes, hares, medium cats
LYNX	150	250	9 000 GSM 130 000 UHF	single or double solar charger on top of the collar	lynx size cats, wolfs
GUANACO	150	200	9 000 GSM 130 000 UHF	double solar charger on sides of the battery pack, battery pack & electronics in on housing	guanaco, antelopes
IMPALA	150	300	9 000 GSM 130 000 UHF	single or double solar charger on top of the collar, drop-off	antelopes, wolfs, lynxes
ORYX	150	350	9 000 GSM 130 000 UHF	double solar charger on top of the collar	big antelopes, horses, bears, lions
DEER	200	800	25 000 GSM 390 000 UHF	triple solar charger on the battery pack, optionally solar charger on top of the collar, drop-off	deer, big antelopes
ELK	300	2000	45 000 GSM 650 000 UHF	double solar charger on top of the collar	elks, the biggest antelopes, lions
BISON	300	2000	45 000 GSM 650 000 UHF	no solar charger, battery pack & electronics in on housing	bisons, buffalos
Ear tag	n.a.	25	solar charger	Designed according to the user specification. We do prepare trackers on typical cattle/goat ear tags or trackers ready for mounting on customer's bands	antelopes, rhinos, elephants, deer

All housings are waterproof up to ~3 m depth.

\*\*\*The above weights are calculated for the GPS-GSM & GPS-GSM-UHF models, for the GPS-UHF subtract ~4g.

\*\*\*\* Calculated for conditions with good quality of the GSM & GPS signal.



## GPS-UHF trackers SRD (short range download)

The smallest and the lightest GPS trackers from our offer. Remote programming and data access via UHF link - no need to recapture animals. Designed for tracking animals (birds, bats, reptiles) during the breeding season that regularly return to their nests, burrows etc. As well all-year-round tracking of migrants is possible, but with data download when tagged animals will be again in the base station range.

### Key features:

- data access & programming via UHF link;
- GPS-UHF intervals: user programmable, from 1 to 240 minutes;
- GPS controlled by the operating-hours schedule or diving sensor;
- delayed start: 24, 48 hours or first diving;
- GPS-UHF data:
  - GPS position, speed, GPS altitude, battery voltage, operating parameters;
  - diving duration with time stamp of each event;
  - diving depth (pressure) & temperature (only versions with a depth sensor).
- GPS-UHF SRD link range: (in the line of sight) ground-to-ground >100m, ground-to-air or air-to-ground >500m;
- diving sensor (wet/dry);
- GPS-UHF LR link: base station hand operated or field installed for an automatic data download and settings change;
- long-life rechargeable battery & charging pins;
- highly efficient solar charger, works well also in a low light conditions ;
- memory capacity: 130.000 GPS positions;

### Optional:

- hydrostatic pressure & temperature sensor (TDR), 0-30 bar (~300m depth), resolution 2.5 mbar (2.6 cm), absolute value accuracy 50 mbar.

### Functions:

- “No GPS signal” - detects no GPS signal and switches off logger in a den, etc.;
- diving duration logger, records each diving event with timestamps;
- UHF signal (base station) can stop GPS data collection, it protects battery in a burrow, den or when animal is in the nest;
- UHF digital telemetry. It has ~50% bigger range than UHF communication link. Enables easier animal locating and coming close enough to download the data.

## Housings choice for GPS-UHF SRD trackers

### Backpack & tail mount series.

Attachment on a harness, glued, fixed by the cable ties or Tessa tape to the hackle or tail feathers.

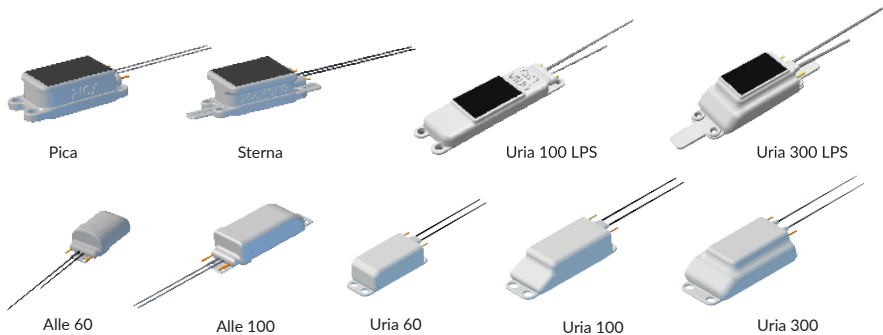
LOGGER MODEL	Dimensions LxWxH [mm]**	Logger weight [g] ***	GPS positions without battery charging****	Description	Recommended for:
Loggers with solar charging					
PICA	36x17x12	5,6	~500 + solar	waterproof up to ~3 m depth	bee-eaters, kestrels, great snipes, terns
STERNA	36x17x13	7,4	~500 + solar	waterproof up to ~3 m depth	small gulls, jackdaws, shearwaters
URIA 100 LPS	54x17x8	10	~1000 + solar	waterproof >200 m depth	puffins, guillemots
URIA 300 LPS	36x23x14	15	~3000 + solar	waterproof >200 m depth	guillemots, boobies
Loggers without solar charging					
ALLE 60	26x16x10	4,5	~500	waterproof up to ~10 m depth	little auks, small owls, bats
ALLE 100	32x16x10	5,9	~1000	waterproof up to ~5 m depth	owls, small falcons, bats
ALLE 300	36x22x12,5	9,4	~3000	waterproof up to ~5 m depth	falcons, capercaillie, owls
URIA 60	26x16x11	6	~500	waterproof >200 m depth, optionally TDR	any diving birds or reptiles
URIA 100	35x16x11	8,5	~1000	waterproof >200 m depth, optionally TDR	any diving birds or reptiles
URIA 300	36x22x12,5	13,5	~3000	waterproof >200 m depth, optionally TDR	any diving birds or reptiles

All housings are waterproof up to ~3 m depth.

\*\*Dimensions without harness loops or external antennas.

\*\*\*The above weights are calculated for the GPS-GSM & GPS-GSM-UHF models, for the GPS-UHF subtract ~4g.

\*\*\*\* Calculated for conditions with good quality of the GSM & GPS signal.



### Collars for small mammals.

Remote data access and programming via UHF, size and weight adaptable to project requirements.

LOGGER MODEL	Diameter from [mm]	Weight from [g] ***	GPS positions without battery charging****	Description
GPS-UHF (SRD) models Recommended for any small mammals or some bird species				
MUSTELA-60	30	6	500	no solar charger
MUSTELA-100	30	9	1000	no solar charger
OPOS-100	40	15	1000	optional solar charger on top of the collar
OPOS-200	40	19	2000	optional solar charger on top of the collar
OPOS-300	40	23	3000	optional solar charger on top of the collar
MINK-300	50	25	3000	optional solar charger on top of the collar
MINK-600	50	30	6000	optional solar charger on top of the collar
MINK-900	50	36	9000	optional solar charger on top of the collar & on the housing

All housings are waterproof up to ~3 m depth.

\*\*\*The above weights are calculated for the GPS-GSM & GPS-GSM-UHF models, for the GPS-UHF subtract ~4g.

\*\*\*\* Calculated for conditions with good quality of the GSM & GPS signal.



### TDR logger with remote data download

Records diving events, depth & temperature. Registers presence in the colony or nest where the base station is installed:

- small and lightweight from 3g;
- data access & programming via SRD UHF link;
- rechargeable battery, low power consumption;
- TDR sensor: 0-30 bar (~300m depth), resolution 2.5 mbar (2.6 cm), absolute value accuracy 50 mbar.

## Base stations & accessories

The base station is necessary to download data from the loggers equipped with UHF SRD or LRD link as well as to change loggers' settings. Base station can be hand-operated as well as installed for automatic data download in place visited by the tagged objects., ie.: in the colony, near the water holes or roost. When base station works continuously, loggers will upload collected data each time when appear in the base station range. Presence in the range (in the colony, nest, roost) will be also recorded in a programmable intervals (1 to 5 minutes) in a base station memory. The base station signal can disable GPS data collection when logger is in its range, to save energy.

### Key features:

- enables remote, automatic data download from the loggers and sending new settings to all Ecotone GPS-UHF trackers;
- distance of bidirectional communication varies between 200m to 6 km and depends on the logger's specification, antenna's version and field conditions.
- records data in a 2GB internal memory without connection to the PC; for data safety base station uses double memory banks (one as a backup);
- power supply by the battery grip, any USB charger or dedicated rechargeable power bank which can work with a solar charger.

### BS-P5 base station

Strong housing with a led window, USB cable with a waterproof connector. The most common base station model used for a hand operating as well as for a long term & unattended work. It works with external omnidirectional or directional antenna.

### BS-P6 base station

Strong housing with a led window, USB cable with a waterproof connector. Special version of a P5 base station with ~70% longer downloading range. Designed for hand operating as well as for a long term & unattended work. It works with external omnidirectional or directional antenna.

### XS-NS base station

Portable, low power & short range base station dedicated for single nests or small colonies. Recommended for colonial birds nesting in burrows, where switching off the GPS when logger is in base station range is important to save energy; short range helps to avoid conflict of a multiple base station use. Works only with a built-in antenna.

### XS-UR base station

Portable & lightweight, high sensitivity & long range base station dedicated for data download with the use of drones. Can be used also as a stand-alone base station for a single nests or small colonies. Works only with a built-in antenna.

### Directional antenna

Gain 19dBi, beamwidth 18°, polarization vertical or horizontal, gold-plated TNC connector, holder for the EP BS-P5 base station.

### Battery grip

Batteries in a battery grip (3x LR 20) last for 10-15 days of continuous work. Equipped with a waterproof USB connector.

## GPS-GSM trackers with fixed factory settings

Worldwide GSM 2G range, data access from the web profile. Designed for tracking ducks, raptors, storks, cormorants etc., as well as mammals. Often used in the reintroduction projects or when four GPS positions per day are sufficient. Those loggers use factory, usually pre-set to 6 hours GPS interval. The pre-set interval can be changed upon request during production.

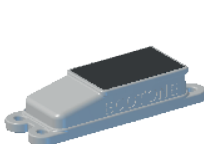
- data upload from memory when GSM network is accessible;
- GPS-GSM data: GPS position, temperature, battery voltage, GSM signal strength, operating parameters;
- long-life rechargeable battery;
- highly efficient solar charger, works as well in a low light conditions;
- data access from the web profile;
- one year of GSM data transfer calculated for 6 h GPS interval included in the price;
- in preparation models with worldwide & USA 2G/3G quad band HSPA/GSM communication range.

LOGGER MODEL	Dimensions LxWxH [mm]**	Logger weight [g] ***	For body weight from:	Description	Recommended for:
SULA-L	59x27x19	28	~1000g	low profile housing , solar charger	birds with thin plumage and short feathers which will not cover solar charger on a low profile housing, e.g. falcons, hawks, gulls, raven
SULA-H	59x27x29	30	~1000g	elevated solar charger	birds with thick plumage and long feathers, e.g. eagles, non-diving ducks of mallard size, big capercaillie, storks
URAL	59x26x18	34	~1200g	no solar charger, battery for ~1000 GPS positions	for tracking birds in a poor light conditions or when feathers can shadow the solar, e.g. eagle owls, ural owls
URAL-1600	55x37x21	50	~1500g	no solar charger, battery for ~2000 GPS positions	for tracking birds in a poor light conditions or when feathers can shadow the solar, e.g. eagle owls, ural owls
SULA COLLAR	Ø 150	200	n.a.	no solar charger, battery for ~12000 GPS positions. Neck diameter from 150 mm	lynx size cats, wolfs, antelopes

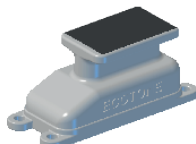
All housings are waterproof up to ~3 m depth.

\*\*Dimensions without harness loops or external antennas.

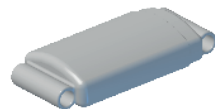
\*\*\*The above weights are calculated for the GPS-GSM & GPS-GSM-UHF models, for the GPS-UHF subtract ~4g.



Sula-L



Sula-H



Ural



Apply for

## ECOTONE TELEMETRY GRANTS

<http://www.ecotone-telemetry.com>

### RESULTS OF GRANTS 2018

We are pleased to announce the winners of the Ecotone Telemetry Grants 2018.

We received more than 100 projects from all over the world.  
All of them were very interesting, which did not facilitate our choice.

We are pleased to announce 2 projects:

- Andrii Simon “ Radiation influence on large raptors during the breeding period”  
from Ukraine
- Peter Calverley “Movement patterns, habitat use and threats facing Giraffe  
in a fractured conservation landscape”  
from South Africa

Moreover, all applicants from GRANTS 2018 edition, have opportunity to buy our equipment with 25% discount to allow for the implementation of their projects.



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