

GPS tracking network for large birds

RESEARCH INSTITUTE NATURE AND FOREST

- Since 1999: study of migration and site/mate fidelity of large gulls
- Since 2011: study of habitat use of Western Marsh Harrier (breeding population in Belgium in decline)



Data collection through
volunteer observations

Volunteer observations

- Individual can be identified with colour ring or wing tag
- Allows to build life history
- Is subjective to sampling bias (populated areas, at land, day)

GPS tracking network for large birds

- Since 2013
- In the framework of the Flemish contributions to LifeWatch
- Partners:

RESEARCH INSTITUTE
NATURE AND FOREST



Vlaams Instituut voor de Zee
Flanders Marine Institute





Data collection through
GPS tags

3 species



Image by Agaat de Poel / WMH image by Francesco Veronesi bit.ly/1HuuEcQ

Lightweight GPS tracker

GPS receiver

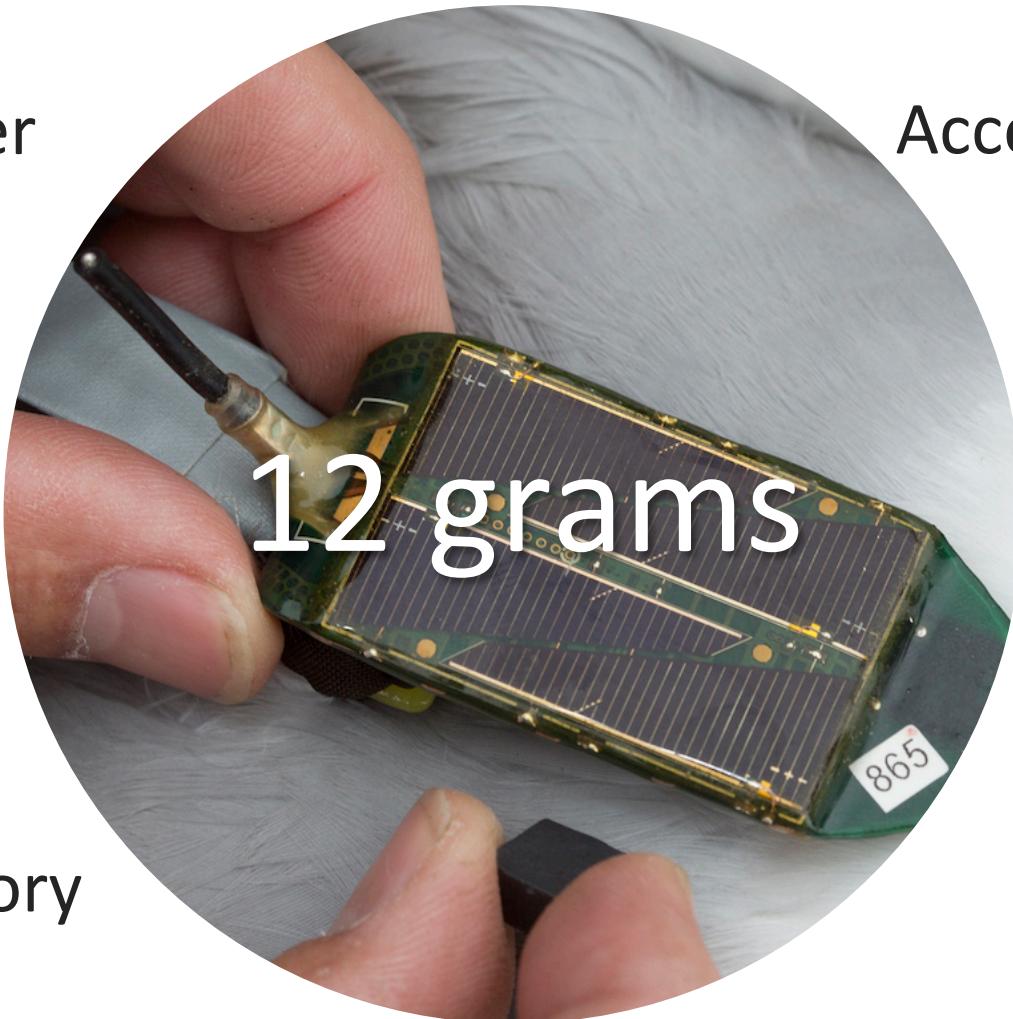
Antenna

Flash memory

Accelerometer

Battery

Solar cells



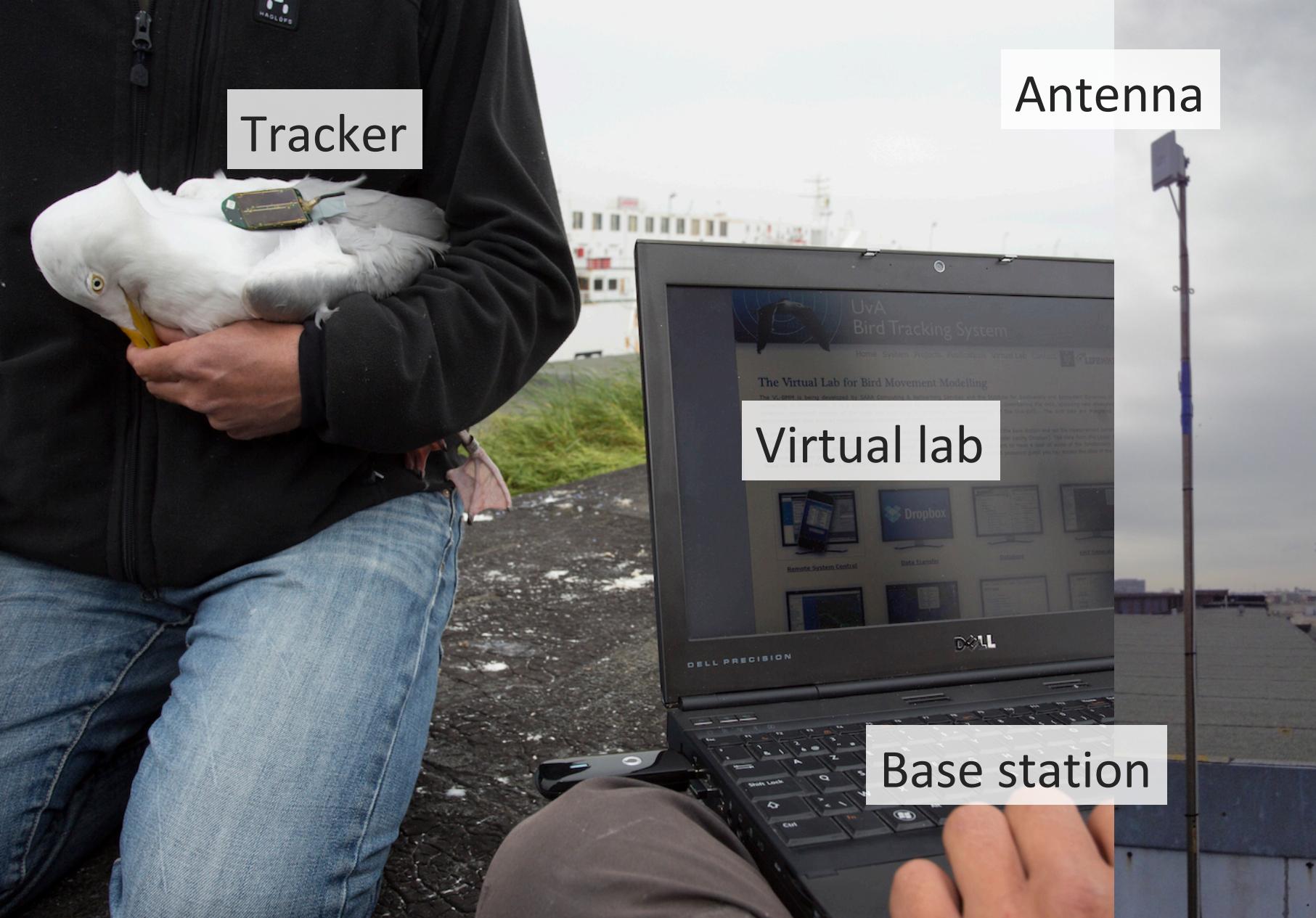


Image by Misjel Decleer, Photo Gallery, VLIZ / Antenna image by VLIZ

UvA-BiTS.nl

The screenshot shows the homepage of the UvA Bird Tracking System. At the top, there's a banner featuring a seagull in flight against a background of digital data and a map. Below the banner, the title "UvA Bird Tracking System" is prominently displayed. A navigation menu includes links for Home, System, Projects, Publications, Virtual Lab, and Contact. To the right of the menu are logos for SURFsara and LIFEWATCH.

The Virtual Lab for Bird Movement Modelling

The VL-BMM is being developed by SURFsara Computing & Networking Services and the Institute for Biodiversity and Ecosystem Dynamics of the University of Amsterdam. It is a e-Science infrastructure for controlling the tracking system, downloading the data, uploading new measurement schemes, persistent storing of the data and exploring or analysing the measurements of the UvA-BiTS. The bird data are integrated with environmental data such as meteorological conditions (ECMWF) or sea currents (Delft3D).

In principle, access to the Virtual Lab is restricted to registered users. These users can control the base station and set the measurement parameters through Remote System Control (using LogMeIn) or download their data through Data Transfer (using Dropbox). The data from the [Lesser Black-backed Gull that visited Amsterdam](#) has been "donated" to accommodate guests who want to have a look at some of the functionality of the database, the kmz-generator, and the script wrapper. When you enter user name *guest* and password *guest* you can access the data of the Lesser Black-backed Gull with ID=1 in the period from 26 June 2010 to 30 June 2010. Please note that the BirdView/BirdSim features are currently unavailable.



[Remote System Control](#)



[Data Transfer](#)



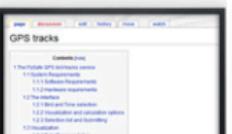
[Dashboard](#)



[Tracker Calendar](#)



[Database](#)



UvA-BiT.S.nl

Projects - UvA-BiT.S

www.uva-bits.nl/projects/ Person 1

UvA Bird Tracking System

Home System Projects Publications Virtual Lab Contact

LIFEWATCH

Map data ©2018 Imagery ©2018 NASA, TerraMetrics | Terms of Use

Google

- Egyptian Vulture, Red Kite, Verreaux's Eagle, Montagu's Harrier, Griffon Vulture, European Honey Buzzard
- Northern Bald Ibis
- Barnacle Goose, Black-tailed Godwit, Eurasian Spoonbill, Brent Goose, Oystercatcher, Crab Plover
- Yellow-legged Gull, Herring gull, Lesser Black-backed Gull, Great Skua

Northern Bald Ibis
Vejer de la Frontera (Cadiz, Andalusia)

Egyptian Vulture
Fuerteventura

Barnacle Goose
Kolokolkova Bay, Russia

Yellow-legged Gull
Marismas del Odiel, Spain

Herring gull
St Ives, UK, Texel, the Netherlands

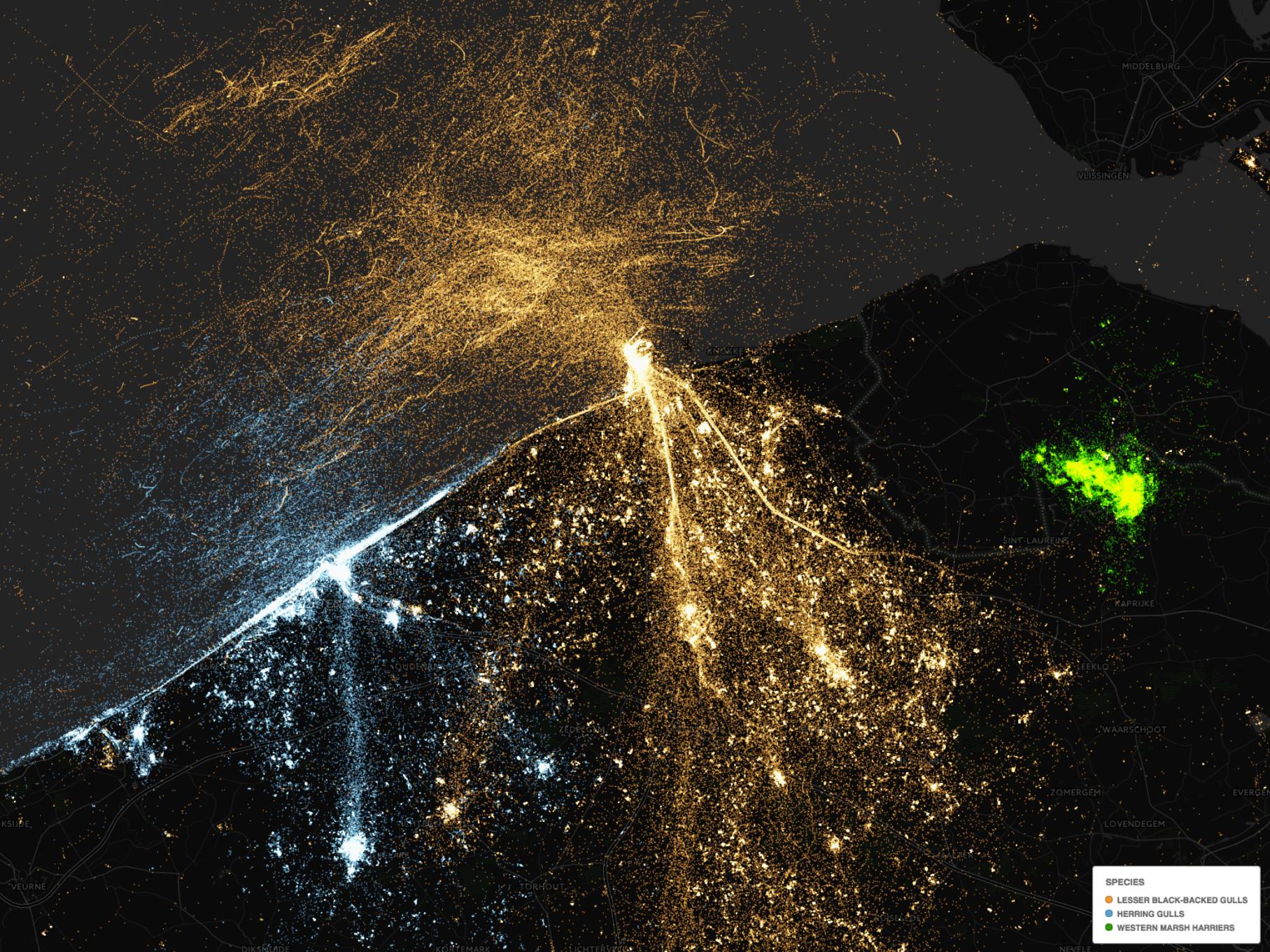
Black-tailed Godwit
Southwest Friesland, the Netherlands

Red Kite
Tuscany, Italy

Data (May 2013 – March 2018)

- 10 million GPS fixes
- For individuals:
 - 134 Lesser Black-backed Gulls (*Larus fuscus*)
 - 48 Herring Gulls (*Larus argentatus*)
 - 7 Western Marsh Harriers (*Circus aeruginosus*)





SPECIES

LESSER BLACK-BACKED GULLS

HERRING GULLS

WESTERN MARSH HARRIERS



lifewatch.inbo.be/blog/posts/gull-migration-data.html

Open data publication

1. Extracted from central database
2. Standardized to Darwin Core
3. Documented with metadata
4. Published under CC0 waiver
5. Registered with GBIF

Darwin Core – Occurrence Core

- basisOfRecord: MachineObservation
- Different for every record:
 - eventDate
 - decimalLatitude / decimalLongitude
 - minimumDistanceAboveSurfaceInMeters
 - occurrenceID
- Groups records for an individual:
 - organismID

Darwin Core – Occurrence Core

	occurrenceID ▲ character	organismID ▲ character	eventDate 🕒 POSIXct	minimumDistanceAboveSurfaceInMeters # integer	decimalLatitude # numeric	decimalLongitude # numeric	coordinateUncertaintyInMeters # integer	scientificName ▲ character	vernacularName ▲ character
1	801:20130517180526	H903185	2013-05-17 18:05:26	-59	51.2331793	2.9294278	28	Larus argentatus	Herring Gull
2	801:20130517183540	H903185	2013-05-17 18:35:40	14	51.2335265	2.9300549	6	Larus argentatus	Herring Gull
3	801:20130517190534	H903185	2013-05-17 19:05:34	-10	51.2334166	2.9302252	8	Larus argentatus	Herring Gull
4	801:20130517193524	H903185	2013-05-17 19:35:24	-6	51.2335162	2.930146	7	Larus argentatus	Herring Gull
5	801:20130517200539	H903185	2013-05-17 20:05:39	15	51.2334828	2.9301077	6	Larus argentatus	Herring Gull
6	801:20130517203539	H903185	2013-05-17 20:35:39	13	51.233497	2.930101	10	Larus argentatus	Herring Gull
7	801:20130517210533	H903185	2013-05-17 21:05:33	11	51.2335424	2.9301439	14	Larus argentatus	Herring Gull
8	801:20130517213535	H903185	2013-05-17 21:35:35	19	51.2334807	2.9301078	7	Larus argentatus	Herring Gull
9	801:20130517220533	H903185	2013-05-17 22:05:33	9	51.2334775	2.930062	11	Larus argentatus	Herring Gull
10	801:20130517223523	H903185	2013-05-17 22:35:23	1	51.2334458	2.93002	14	Larus argentatus	Herring Gull
11	801:20130517233522	H903185	2013-05-17 23:35:22	22	51.2334852	2.9300274	6	Larus argentatus	Herring Gull
12	801:20130518003549	H903185	2013-05-18 00:35:49	1	51.2336368	2.9300702	16	Larus argentatus	Herring Gull
13	801:20130518013634	H903185	2013-05-18 01:36:34	13	51.2334629	2.9300837	5	Larus argentatus	Herring Gull
14	801:20130518023642	H903185	2013-05-18 02:36:42	0	51.2334656	2.9299976	7	Larus argentatus	Herring Gull
15	801:20130518033642	H903185	2013-05-18 03:36:42	13	51.2335142	2.9300391	14	Larus argentatus	Herring Gull
16	801:20130518044049	H903185	2013-05-18 04:40:49	-3	51.2438277	2.9277227	18	Larus argentatus	Herring Gull
17	801:20130518051110	H903185	2013-05-18 05:11:10	15	51.2422381	2.9406941	24	Larus argentatus	Herring Gull
18	801:20130518054133	H903185	2013-05-18 05:41:33	17	51.2335088	2.9299045	6	Larus argentatus	Herring Gull
19	801:20130518061133	H903185	2013-05-18 06:11:33	2	51.2336305	2.9299294	11	Larus argentatus	Herring Gull
20	801:20130518064136	H903185	2013-05-18 06:41:36	18	51.2380398	2.9227627	15	Larus argentatus	Herring Gull
21	801:20130518071129	H903185	2013-05-18 07:11:29	14	51.2334934	2.929957	10	Larus argentatus	Herring Gull
22	801:20130518074139	H903185	2013-05-18 07:41:39	14	51.2335193	2.9299606	4	Larus argentatus	Herring Gull
23	801:20130518081138	H903185	2013-05-18 08:11:38	15	51.2335148	2.9299916	13	Larus argentatus	Herring Gull
24	801:20130518084130	H903185	2013-05-18 08:41:30	17	51.2335364	2.9300996	7	Larus argentatus	Herring Gull
25	801:20130518091123	H903185	2013-05-18 09:11:23	31	51.2334805	2.930142	12	Larus argentatus	Herring Gull
26	801:20130518094125	H903185	2013-05-18 09:41:25	10	51.2335493	2.9300356	12	Larus argentatus	Herring Gull
27	801:20130518101207	H903185	2013-05-18 10:12:07	21	51.2381833	2.9227217	22	Larus argentatus	Herring Gull
28	801:20130518104320	H903185	2013-05-18 10:43:20	8	51.2391683	2.914445	20	Larus argentatus	Herring Gull

Published via the IPT

The screenshot shows a web browser window with the following details:

- Title Bar:** Bird tracking - GPS tracking of Gulls
- Address Bar:** https://ipt.inbo.be/resource?r=bird-tracking-gull-occurrences
- Header:** Person 1
- Logo:** GBIF INTEGRATED PUBLISHING TOOLKIT^(IPT)
free and open access to biodiversity data
- User Interface:** Includes fields for email, password, login, and language selection (ENGLISH).
- Main Navigation:** Home (highlighted), About.
- Left Sidebar:** A tree icon followed by a list of metadata categories: Summary, Data Records, Downloads, Versions, How to cite, Rights, GBIF Registration, Keywords, Contacts, Geographic Coverage, Taxonomic Coverage, Temporal Coverage, Sampling Methods, Bibliographic Citations, and Additional Metadata.
- Central Content:**
 - Title:** Bird tracking - GPS tracking of Lesser Black-backed Gulls and Herring Gulls breeding at the southern North Sea coast
 - Text:** Latest version published by Research Institute for Nature and Forest (INBO) on Apr 26, 2017
 - Description:** Bird tracking - GPS tracking of Lesser Black-backed Gulls and Herring Gulls breeding at the southern North Sea coast is a species occurrence dataset published by the Research Institute for Nature and Forest (INBO) and described (v5.5) in Stienen et al. 2016. It contains close to 8.5 million occurrences (GPS fixes) recorded by GPS trackers mounted on 108 Lesser Black-backed Gulls and 37 Herring Gulls breeding at the Belgian and Dutch coast. The trackers are developed by the University of Amsterdam Bird Tracking System (UvA-BITS, <http://www.uva-bits.nl>) and allow to study the gulls' habitat use and migration behaviour in great detail. Our bird tracking network is operational since 2013 and is maintained and used by the INBO, the Flanders Marine Institute (VLIZ), UvA-BITS, Ghent University (UGent), and the University of Antwerp (UA). See the dataset metadata for contact information, scope, and methodology. Issues with the dataset can be reported at <https://github.com/inbo/data-publication/tree/master/datasets/bird-tracking-gull-occurrences>.
 - Footnote:** The following information is not included in the dataset and available upon request: outliers, temperature, speed, accelerometer data, GPS metadata (fix time, number of satellites used, vertical accuracy), bird biometrics data measured during tagging (bill length, bill depth, tarsus length, wing length, body mass), life history data (day of ringing, age, resightings by volunteers), as well as growth data of chicks.

ipt.inbo.be/resource?r=bird-tracking-gull-occurrences

Registered with GBIF

Bird tracking - GPS tracking of  Person 1

Secure | <https://www.gbif.org/dataset/83e20573-f7dd-4852-9159-21566e1e691e>

 Get data Share Tools Inside GBIF   Login

OCCURRENCE DATASET | REGISTERED 17 JULY 2014

Bird tracking - GPS tracking of Lesser Black-backed Gulls and Herring Gulls breeding at the southern North Sea coast

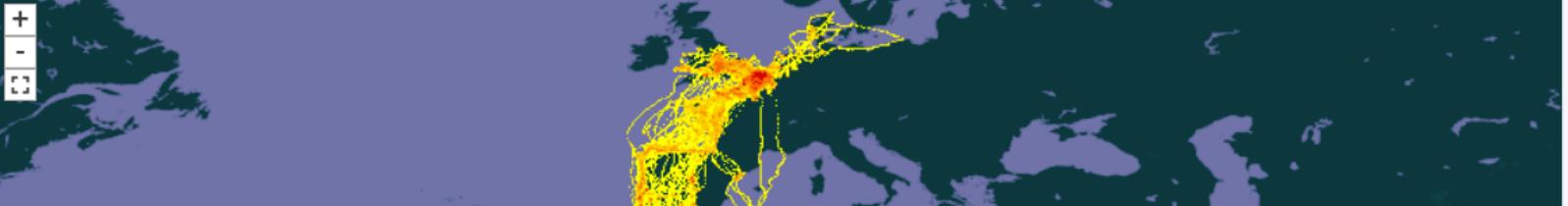
Published by [Research Institute for Nature and Forest \(INBO\)](#)

Eric W.M. Stienen • Peter Desmet • Bart Aelterman • Wouter Courtens • Simon Feys • Nicolas Vanermen • Hilbran Verstraete • Marc Van de walle • Klaas Deneudt • Francisco Hernandez • Robin Houchoofdt • Bart Vanhoorne • Willem Bouten • Roland-Jan Buijs • Marwa M. Kavelaars • Wendt Müller • David Herman • Hans Matheve • Alejandro Sotillo • Luc Lens

DATASET METRICS ACTIVITY  DOWNLOAD  DATASET HOMEPAGE 8,474,604 OCCURRENCES 6 CITATIONS

 8,474,604 Occurrences  100% With taxon match  100% With coordinates  100% With year

8,474,604 GEOFERENCED RECORDS 



doi.org/10.15468/02omly

Searchable through GBIF

The screenshot shows the GBIF Occurrence search interface. The top navigation bar includes links for 'Occurrence search', 'Person 1', and various user icons. The main search bar contains the URL: https://www.gbif.org/occurrence/search?dataset_key=83e20573-f7dd-4852-9159-21566e1e691e&organism_id=h903185&advanced=1. The search results page displays 136,923 results for *Larus argentatus* Pontoppidan, 1763. The results are presented in a table with columns for Scientific Name, Country Or Area, Coordinates, Basis Of Record, and Month & Year. The results show multiple occurrences from Belgium, with coordinates ranging from 51.1N, 3.0E to 51.2N, 3.0E, all recorded as machine observation in January 2016.

SEARCH OCCURRENCES 136,923 RESULTS				
TABLE	GALLERY	MAP	TAXONOMY	CHARTS
				DOWNLOAD
Scientific Name		Country Or Area		Coordinates
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.2N, 3.0E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.2N, 3.0E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.1N, 3.1E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.1N, 3.1E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.2N, 2.9E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.2N, 2.9E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.1N, 3.1E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.2N, 3.0E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.1N, 3.1E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.2N, 2.9E
<i>Larus argentatus</i> Pontoppidan, 1763		Belgium		51.1N, 3.1E

www.gbif.org/occurrence/search?dataset_key=83e20573-f7dd-4852-9159-21566e1e691e&organism_id=h903185&advanced=1

Described in data paper

The screenshot shows a web browser window displaying a data paper from ZooKeys. The title of the paper is "GPS tracking data of Lesser Black-backed Gulls and Herring Gulls breeding at the southern North Sea coast". The authors listed are Eric W.M. Stienen, Peter Desmet, Bart Aelterman, Wouter Courtens, Simon Feys, Nicolas Vanermen, Hilbran Verstraete, Marc Van de Walle, Klaas Deneudt, Francisco Hernandez, Robin Houthoofdt, Bart Vanhoorne, Willem Bouten, Roland-Jan Buijs, Marwa M. Kavelaars, Wendt Müller, David Herman, Hans Matheve, Alejandro Sotillo, and Luc Lens. The abstract describes a dataset containing close to 2.5 million occurrences of GPS tracked birds, recorded by 101 trackers on 75 Lesser Black-backed Gulls and 26 Herring Gulls. The dataset is published by INBO and funded by LifeWatch and the Hercules Foundation. The methodology section details the study extent, sampling, quality control, and method steps. The page also features social sharing icons and navigation links for the article.

GPS tracking data of Lesser Black-backed Gulls and Herring Gulls breeding at the southern North Sea coast

Eric W.M. Stienen, Peter Desmet, Bart Aelterman, Wouter Courtens, Simon Feys, Nicolas Vanermen, Hilbran Verstraete, Marc Van de Walle, Klaas Deneudt, Francisco Hernandez, Robin Houthoofdt, Bart Vanhoorne, Willem Bouten, Roland-Jan Buijs, Marwa M. Kavelaars, Wendt Müller, David Herman, Hans Matheve, Alejandro Sotillo, Luc Lens

Abstract

In this data paper, *Bird tracking - GPS tracking of Lesser Black-backed Gulls and Herring Gulls breeding at the southern North Sea coast* is described, a species occurrence dataset published by the Research Institute for Nature and Forest (INBO). The dataset (version 5.5) contains close to 2.5 million occurrences, recorded by 101 GPS trackers mounted on 75 Lesser Black-backed Gulls and 26 Herring Gulls breeding at the Belgian and Dutch coast. The trackers were developed by the University of Amsterdam Bird Tracking System (UvA-BiTS, <http://www.uva-bits.nl>). These automatically record and transmit bird movements, which allows us and others to study their habitat use and migration behaviour in great detail. Our bird tracking network is operational since 2013. It is funded for LifeWatch by the Hercules Foundation and

Article title

Abstract

Keywords

Data published through

Rationale

Taxonomic coverage

Geographic coverage

Temporal coverage

Methodology

Datasets

Stienen et al. (2013) doi.org/10.3897/zookeys.555.6173

Thank you

www.lifewatch.be/en/gps-tracking-network-large-birds

lifewatch.inbo.be

@LifeWatchINBO

@LifeWatchVLIZ