

EUROPEAN TRACKING NETWORK

De Centrale
databank
en de noodzaak van
een Open Protocol



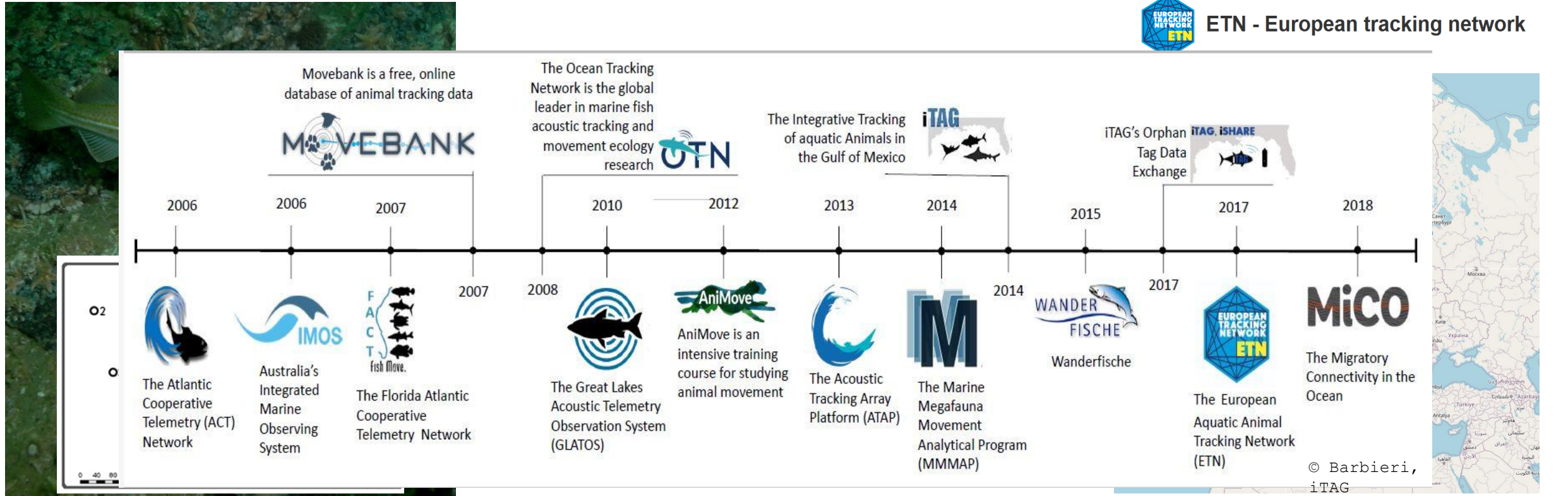
Jan Reubens
and the magnificent
colleagues, collaborators &
ETN team



Setting the Scene



ETN - European tracking network



© Barbieri, iTAG

Who we are...



Kim Birnie-Gauvin - Communications Manager



Robert Lennox - Funding



Claudia Meneses - Data Management



Jan Reubens - Chair



David Villegas-Rios - Theoretical & Applied Research



David Abecasis - Theoretical & Applied Research



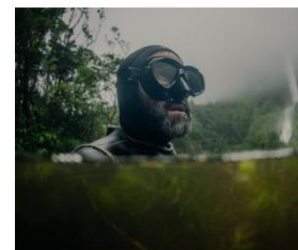
Josep Alós - Theoretical & Applied Research



Danielle Orrell - Integration & Embedding



Inge van der Knaap - Integration & Embedding



Pedro Afonso - Integration & Embedding



Kim Aarestrup - Infrastructure & Tech Development



Ross McGill - Infrastructure

... and what we do



Main Objective

Development of a pan-European telemetry network to track aquatic animals across Europe to better understand, protect and manage them, in support of

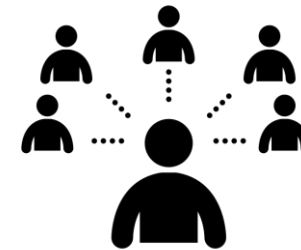
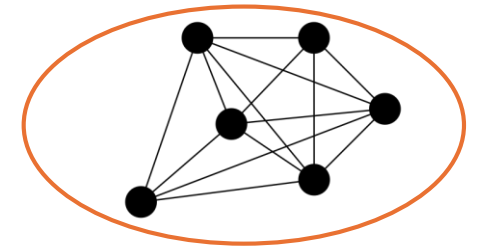
- 1) *European policy priorities and initiatives* in relation to biodiversity, nature conservation/restoration, food security and blue economy
- 2) breakthrough science and cutting-edge technological innovation.

Data applications

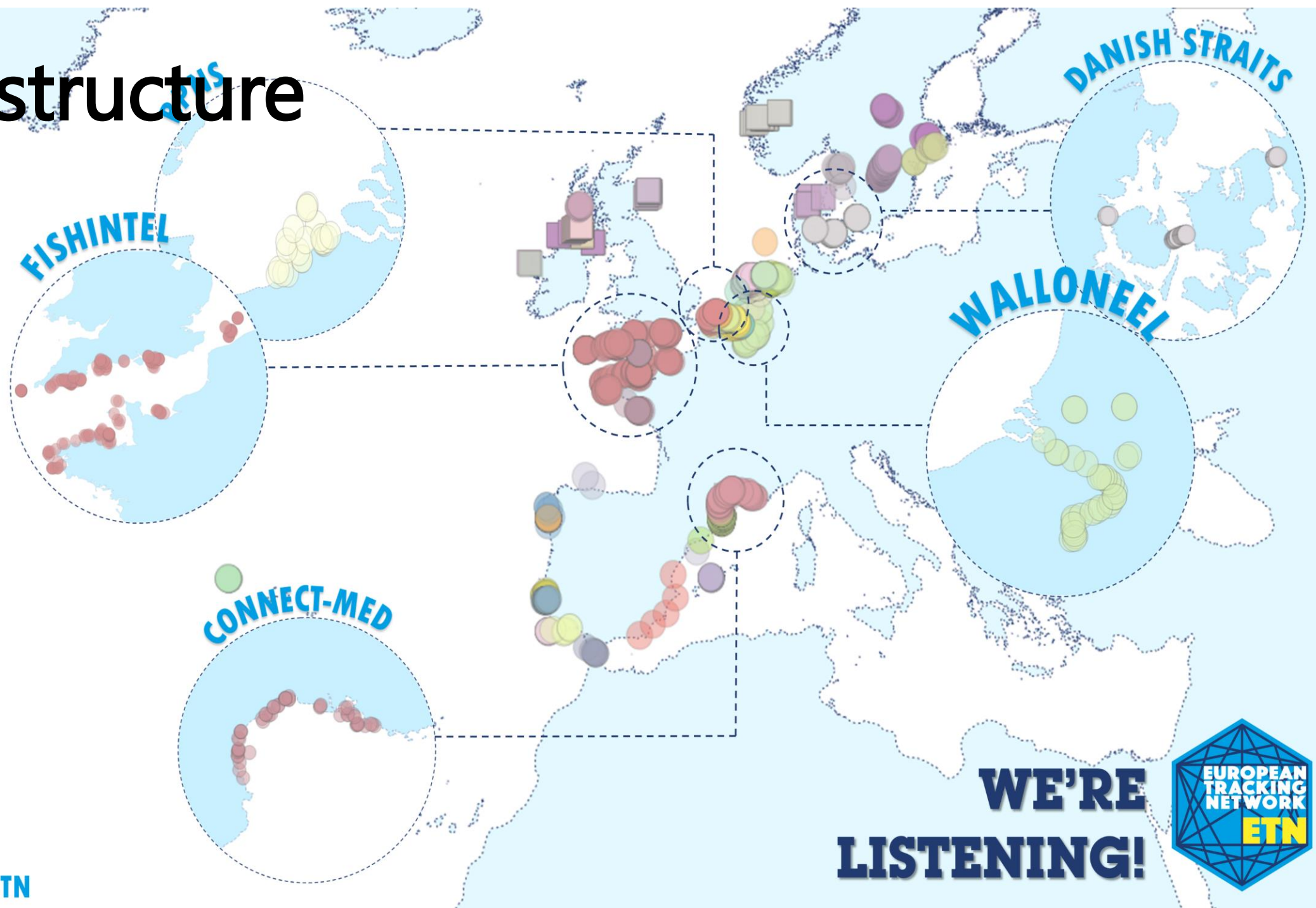
- Addressing knowledge gaps:
 - Fish migration routes and timing (fisheries management)
 - Important animal 'hot-spots' (marine spatial planning)
 - ...
- Addressing bigger questions
 - Impact of human activity populations (mitigation and conservation)
 - Trophic level analysis (fisheries management)



... and what we do



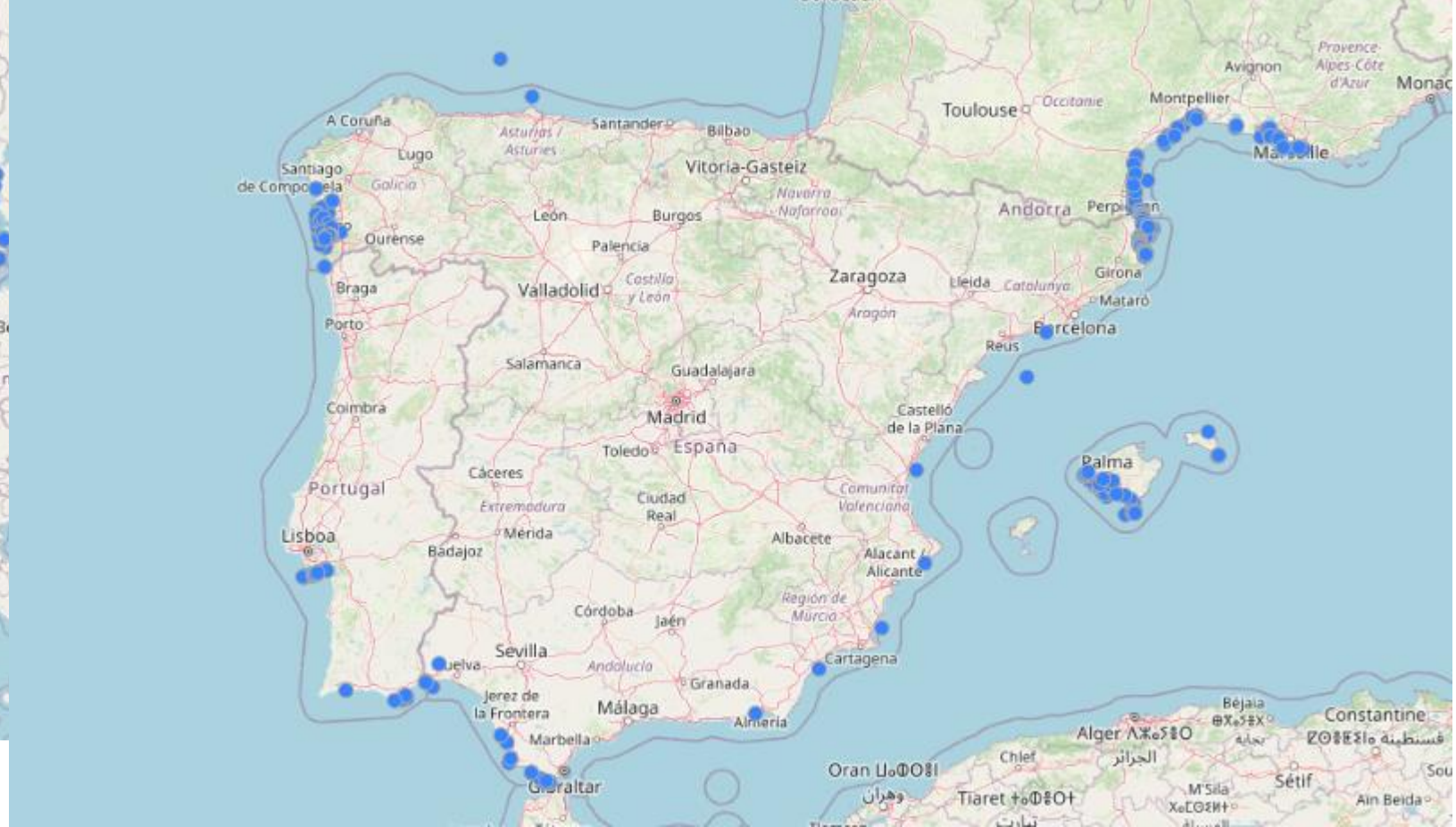
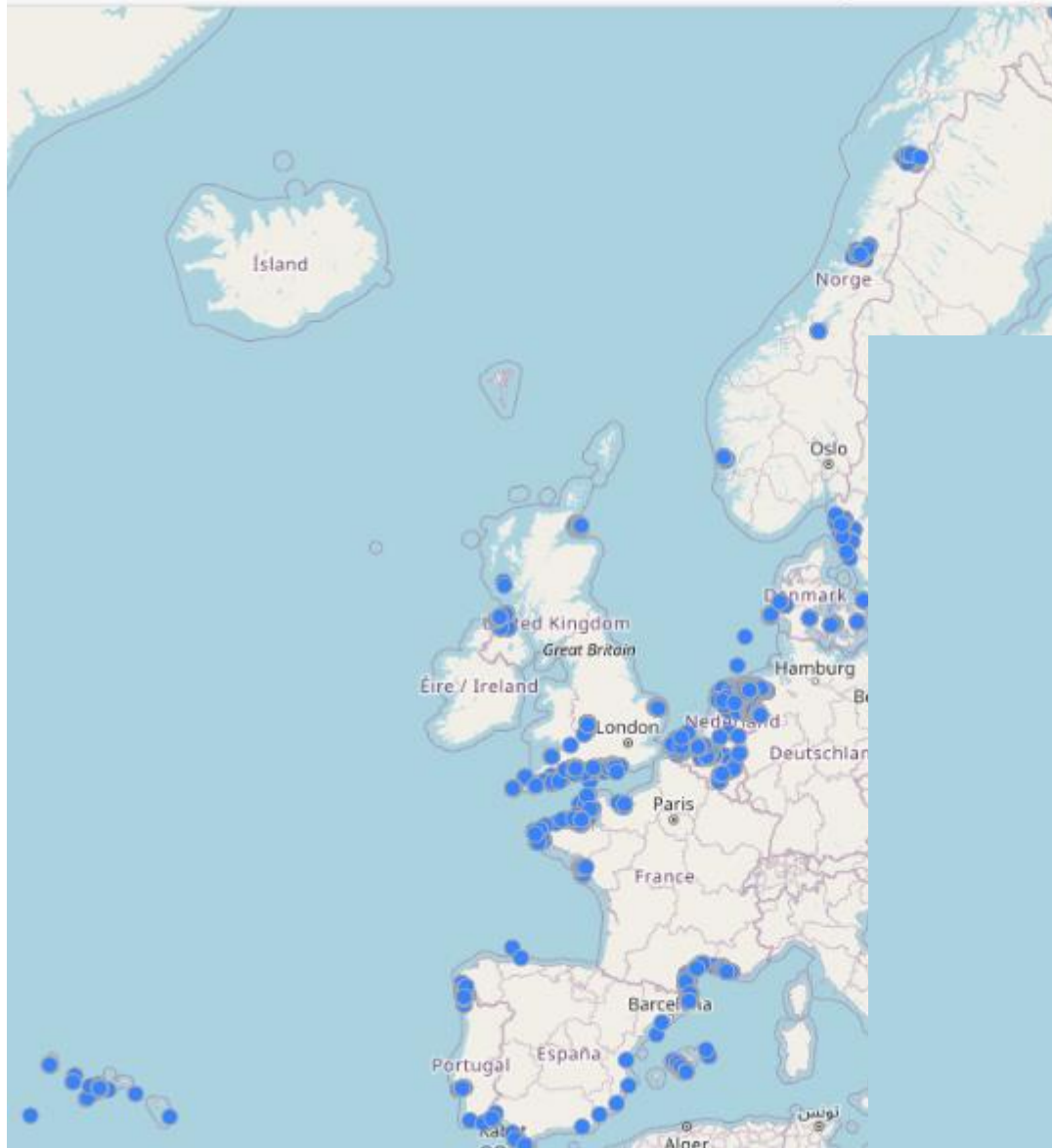
Infrastructure



○ ETN □ OTN

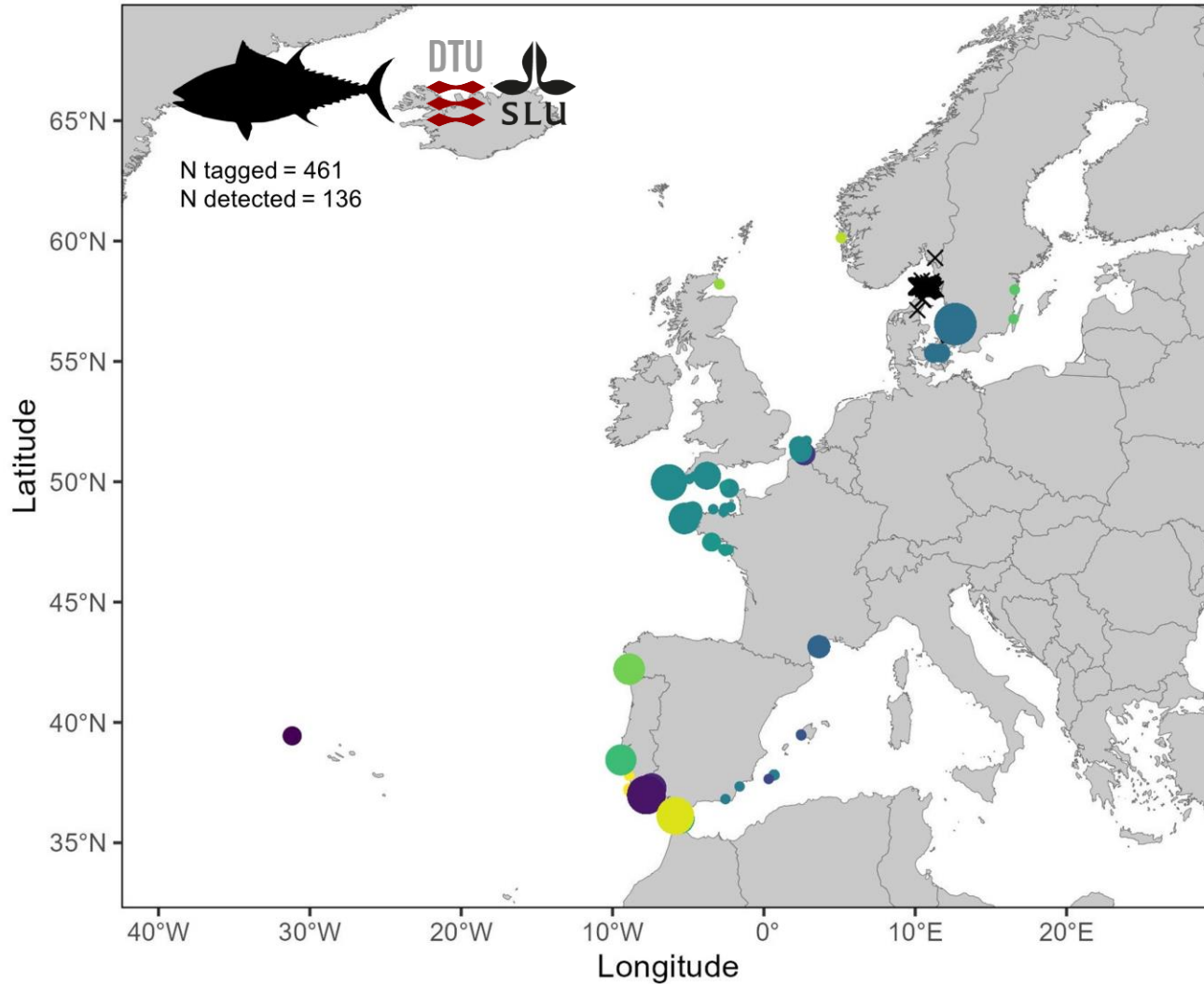
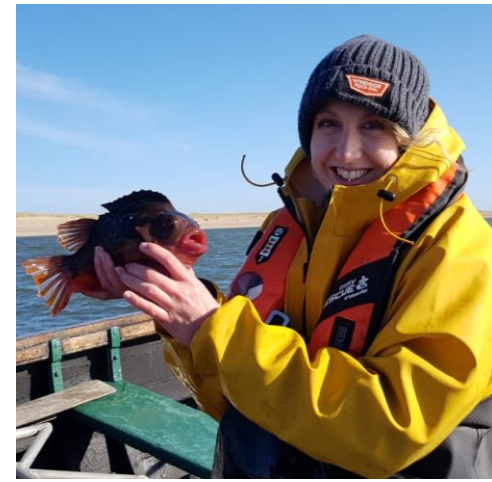
WE'RE LISTENING!



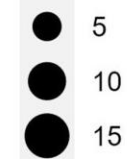


A few examples...

Collaborative work on transboundary movements by Jena Edwards

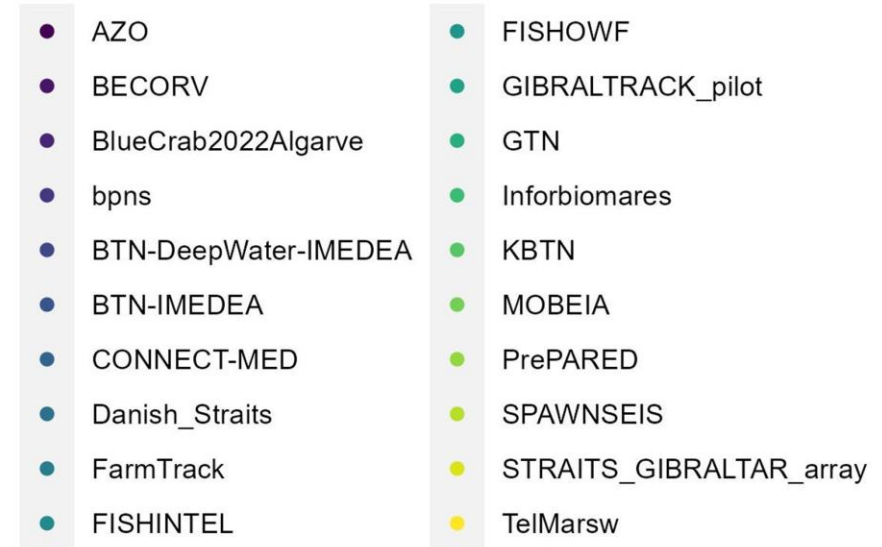


N fish detected

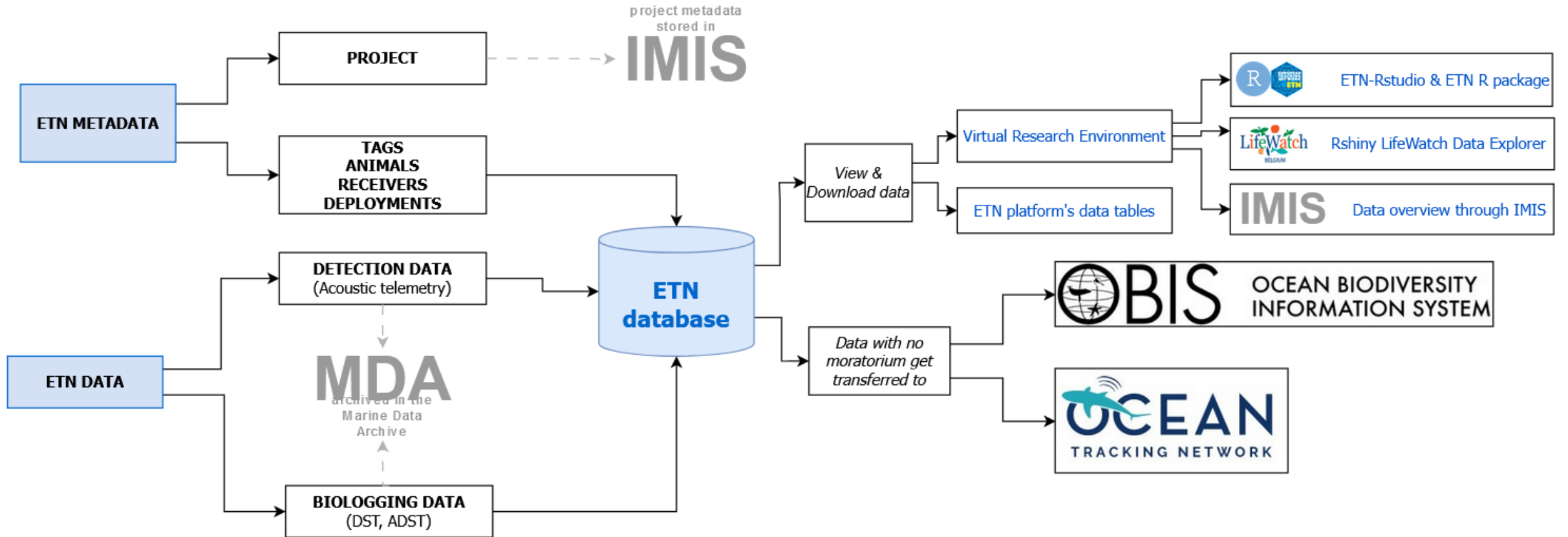


X Release location

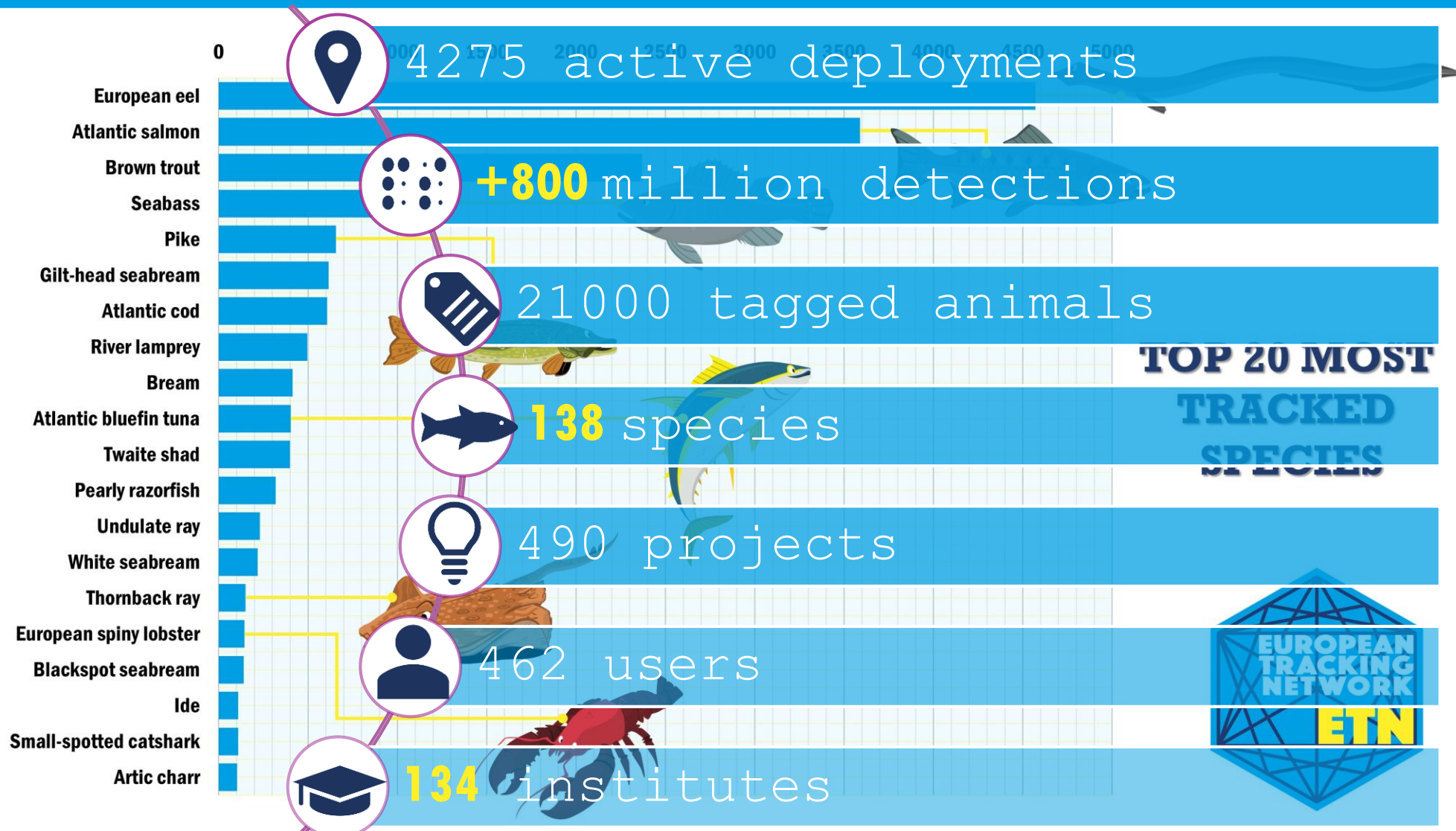
Acoustic array



Data-Infrastructure



Some Statistics of ETN



Dataset catalogue



15 records found

<https://europeantrackingnetwork.org/en/dataset-catalogue>

Dataset catalogue

Scientific name

Author

Geographical coverage

From year

To year

Full text search

Special Collection

Map coordinates

Archival data series and acoustic detections of acoustic data storage tags in the southern North Sea

Citation: Goossens, J.; Verhelst, P.; van der Knaap, I.; Reubens, J.; Woillez, M.; Ghent University, Marine Biology Research Group; Research Institute for Nature and Forest; Flanders Marine Institute: Belgium; Research Institute for Exploitation of the Sea: France; (2022): Archival data series and acoustic detections of acoustic data storage tags in the southern North Sea. Marine Data Archive. <https://doi.org/10.14284/581>

Abstract

More info

Acoustic data from drifts in the Belgian Part of the North Sea 2020-2021

Citation: Parcerisas C.; Debusschere E.; Flanders Marine Institute (VLIZ): Belgium; (2022): Acoustic data from drifts in the Belgian Part of the North Sea 2020-2021. Marine Data Archive. <https://doi.org/10.14284/586>

Abstract

More info

INTERREG_CANAPE_Creating A New Approach To Peatland Ecosystems

Citation: van Eerbeek, J. Van Hall Larenstein: CANAPE; 2018

Abstract

More info

Acoustic Ecology of Pelagic Fish Communities

Abstract

More info

Clear way for fish 2

HOW DOES ETN WORK?



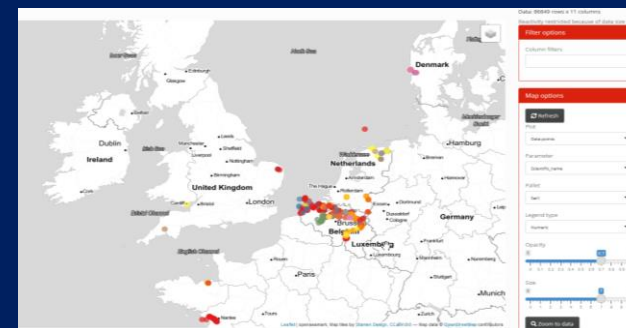
CREATE AN ETN PROJECT

DATA IMPORT



Into ETN platform
CSV Templates

DATA VISUALIZATION



LifeWatch data explorer

DATA STORAGE



Marine
Data
Archive

DATA ANALYSIS

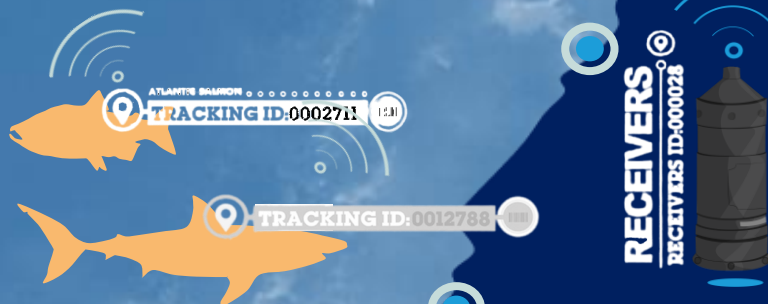


Rstudio
server



ETN R
package

UPLOAD DATA & METADATA



 Lifewatch data explorer

Data source

Map

Data table

Time plots

Plots

Exploring fish telemetry data

Aquatic animal tracking data from the [European Tracking Network](#).

- Partners: ETN members
- Period: since January 2003
- Geographical coverage: Europe
- Taxonomic coverage: [Pisces](#)
- Moratorium: Some project data is under moratorium. Login or [register](#) to get full access
- Data quality: Research-grade

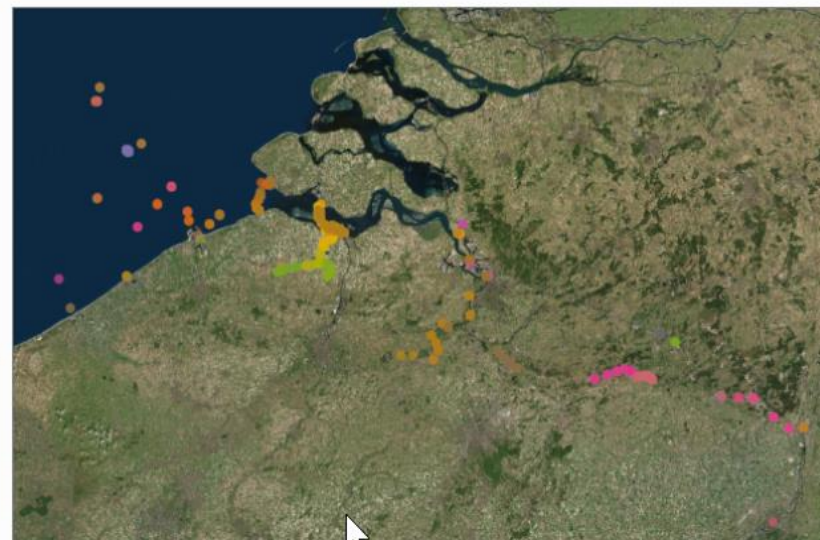
How to interpret this dataset

Query options

- **Data Source:** One of: **Time bins:** Number of detections per tag and per station based on the selected sample period; **Residencies:** groups detections by period spent at each receiver and sampling frequency; or **Active network:** list of active deployments, in which case time = start of deployment.
- **Network:** The network of receiver or antenna deployments.
- **Project:** Animal project linked to the tag deployments.
- **Sample period:** Counts aggregated. One of 1 week, 1 day, 60 min, 10 min or 1 min.
- **Timeframe:** Starting and stopping date for the query.

Available columns

- **Counts:** Total GPS fixes or detections.
- **Scientific_name:** The latin name of the species.
- **Project:** Project in charge of receiver deployments.
- **Network:** The network of receiver or antenna deployments.
- **Time:** Time in UTC, beginning of sample timeperiod.
- **Longitude:** Center longitude in decimal degrees, WGS84
- **Latitude:** Center latitude in decimal degrees, WGS84
- **Station:** Name or code of sampling station or receiver code.
- **Receiver:** Receiver name, composed of 'Model number':'Serial number'.
- **Code:** Code of device on / in individual.
- **Moratorium:** Some data fields are masked, pending official data publication. eg Species name.
- **Duration:** Total time since receiver deployment (in hours).
- **Remaining:** Battery life remaining in the receiver (in hours).
- **Expiry_date:** As in 'BATTERY_ESTIMATED_END_DATE' is the estimated date at which receiver will stop recording. This date is calculated automatically from (Deployments/Battery install date) and (Receivers/Expected battery life).
- **Location_name:** Name of receiver location. Please refer to a specific nearby point of land, town, island, or body of water that uniquely identifies this receiver location.
- **Residency:** Time in hours that an animal was present at a station.
- **Absence:** Time in hours that an animal was not detected at a station (calculated between end of previous residence and start of current residence period).
- **Species:** Scientific name of the animal, as in *Gadus morhua*.



<https://rshiny.lifewatch.be/etn-data/>

Data: 87048 rows x 11 columns

Reactivity restricted because of data size

Query options

Data source

Time bins

Network

All

Project

All

Sample period


1 week

Timeframe

2010-01-01

-

2022-03-20


 Reload

Data options

Calculate or link data

Columns to hide

empty columns

 Calculate

Filter options

THE ETN R PACKAGE HAS MULTIPLE APPLICATIONS

Directly download your data:

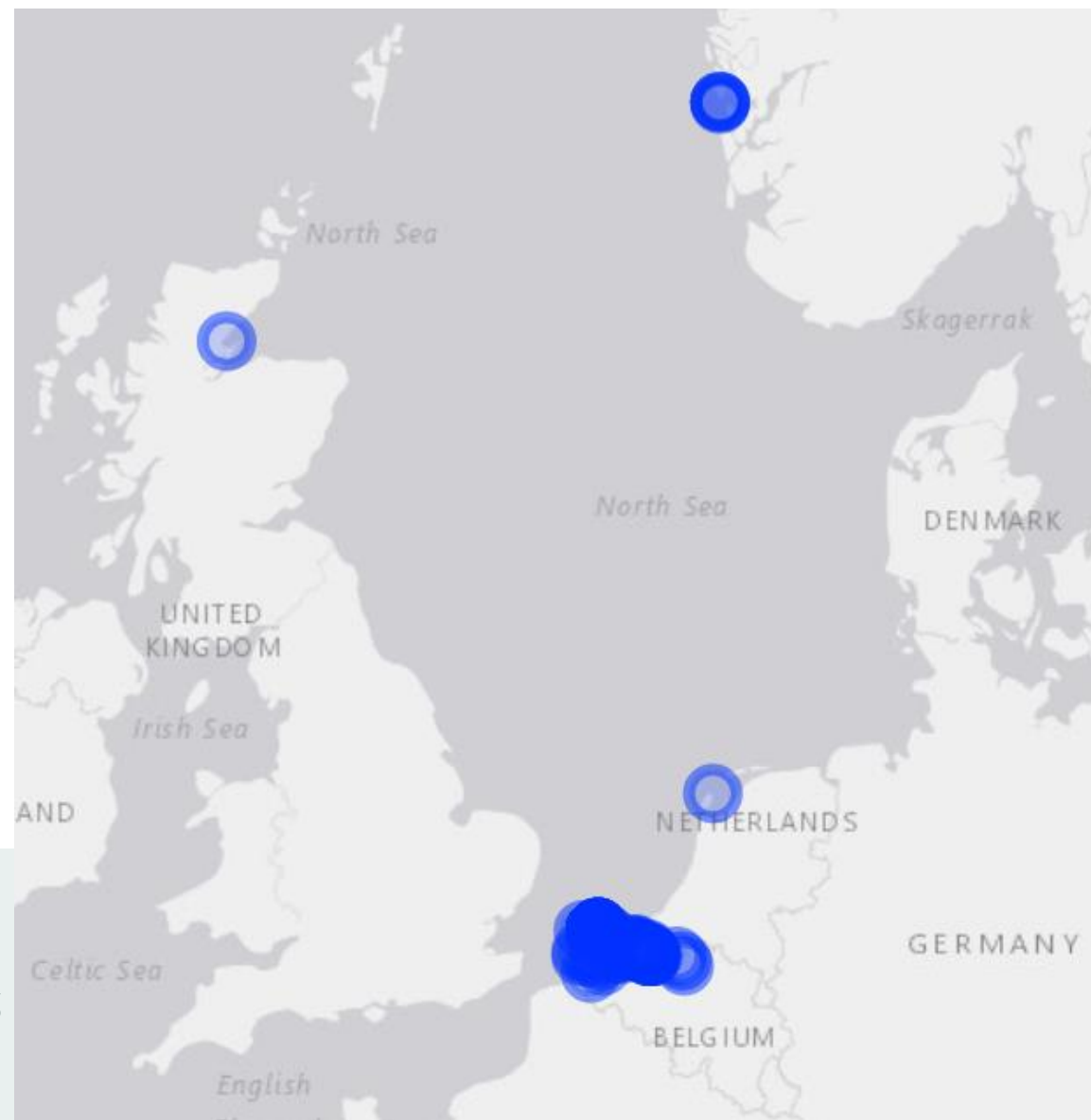
detection_id	date_time	tag_serial_number	acoustic_tag_id	animal_project_code	animal_id	scientific_name	acoustic_project_code	receiver_id	station_name
21131897	2014-07-11 03:17:16	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
22571361	2014-07-11 03:27:18	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
20952401	2014-07-11 03:32:00	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
21440268	2014-07-11 03:39:23	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
20996298	2014-07-11 09:31:04	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
21589595	2014-07-11 10:20:39	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
21043731	2014-07-11 15:11:50	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
20596459	2014-07-11 16:29:53	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
21491968	2014-07-11 17:14:10	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
22567308	2014-07-11 17:37:15	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-110779	bpns-VG2
24324224	2014-08-22 09:04:04	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-123823	bpns-WK14
22455707	2014-08-22 09:04:04	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-123823	bpns-WK14
24324225	2014-08-22 09:07:03	1172817	A69-1601-13631	2015_phd_verhelst_cod	235	Gadus morhua	bpns	VR2W-123823	bpns-WK14

```
# get all the detections in ETN that come from tags in your animal project:  
my_detections <- get_acoustic_detections(animal_project_code = "2015_phd_verhelst_cod")
```


THE ETN R PACKAGE HAS MULTIPLE APPLICATIONS

Check where your animals have been detected:

```
# plot the stations where your animals have been detected:
leaflet(geo_info_stations) %>%
  addTiles() %>%
  addProviderTiles(providers$Esri.WorldGrayCanvas) %>%
  addCircleMarkers(
    lng = ~deploy_longitude,
    lat = ~deploy_latitude,
    popup = ~paste0("Station: ", station_name, "(", acoustic_project_code, ")")
  )
```



THE ETN R PACKAGE HAS MULTIPLE APPLICATIONS

Create annual tagging reports:

STRAITS Annual tagging report

Claudia Meneses

11/10/2023

The STRAITS project

Strategic Infrastructure for improved animal Tracking in European Seas (STRAITS) will leverage ongoing acoustic tracking projects across the four corners of Europe (i.e., North Channel, Danish Straits, Straits of Gibraltar and the Bosphorus/Dardanelles) by expanding efforts to connect initiatives on species-based biodiversity management while developing data management plans and networking channels to deliver data to national and international governing bodies.

Coordinating aquatic animal tracking and environmental observation efforts at a scale that will be usable to make progress on international marine management and planning, is a major step towards an operational European Tracking Network (ETN) that contributes to major European biodiversity initiatives, conservation, and policy.

Tagging efforts Pieterjan Verhalst PhD (2015)

Overview

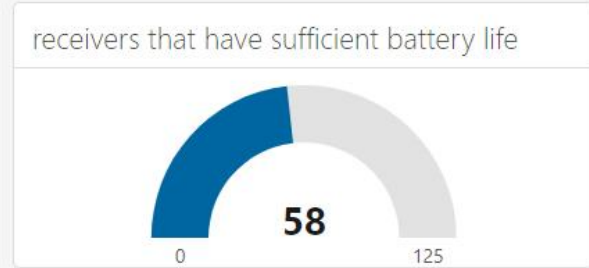
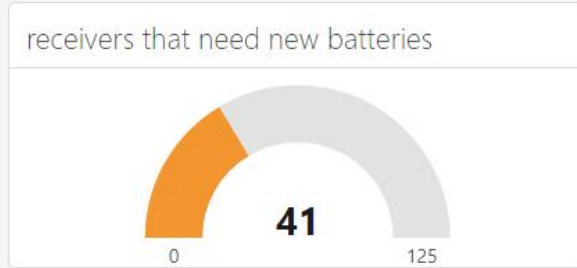
Overview table of the tagging effort

scientific_name	tag_type	year	capture_location	capture_method	n
Anguilla anguilla	acoustic	2015	Dijle (weir Mechelen Nekkerspoel)	double fyke nets	9
Anguilla anguilla	acoustic	2015	Zeeschelde (Bergenmeersen, Wichelen)	double fyke nets	4
Anguilla anguilla	acoustic	2015	Zeeschelde (Killeweg, Dendermonde)	double fyke nets	2
Anguilla anguilla	acoustic	2015	Zeeschelde (Lepelstraat, Rupelmonde)	double fyke nets	2
Anguilla anguilla	acoustic	2015	Zeeschelde (ringvaart, Merelbeke)	double fyke nets	20
Anguilla anguilla	acoustic	2015	Zeeschelde (veerboot, Kastel)	double fyke nets	7



125

receivers are currently deployed



Quick info

This dashboard gives an overview on all open acoustic deployments within the boundaries of the Belgian Part of the North Sea. It is effective as of 2024-02-18.

The dashboard helps to:

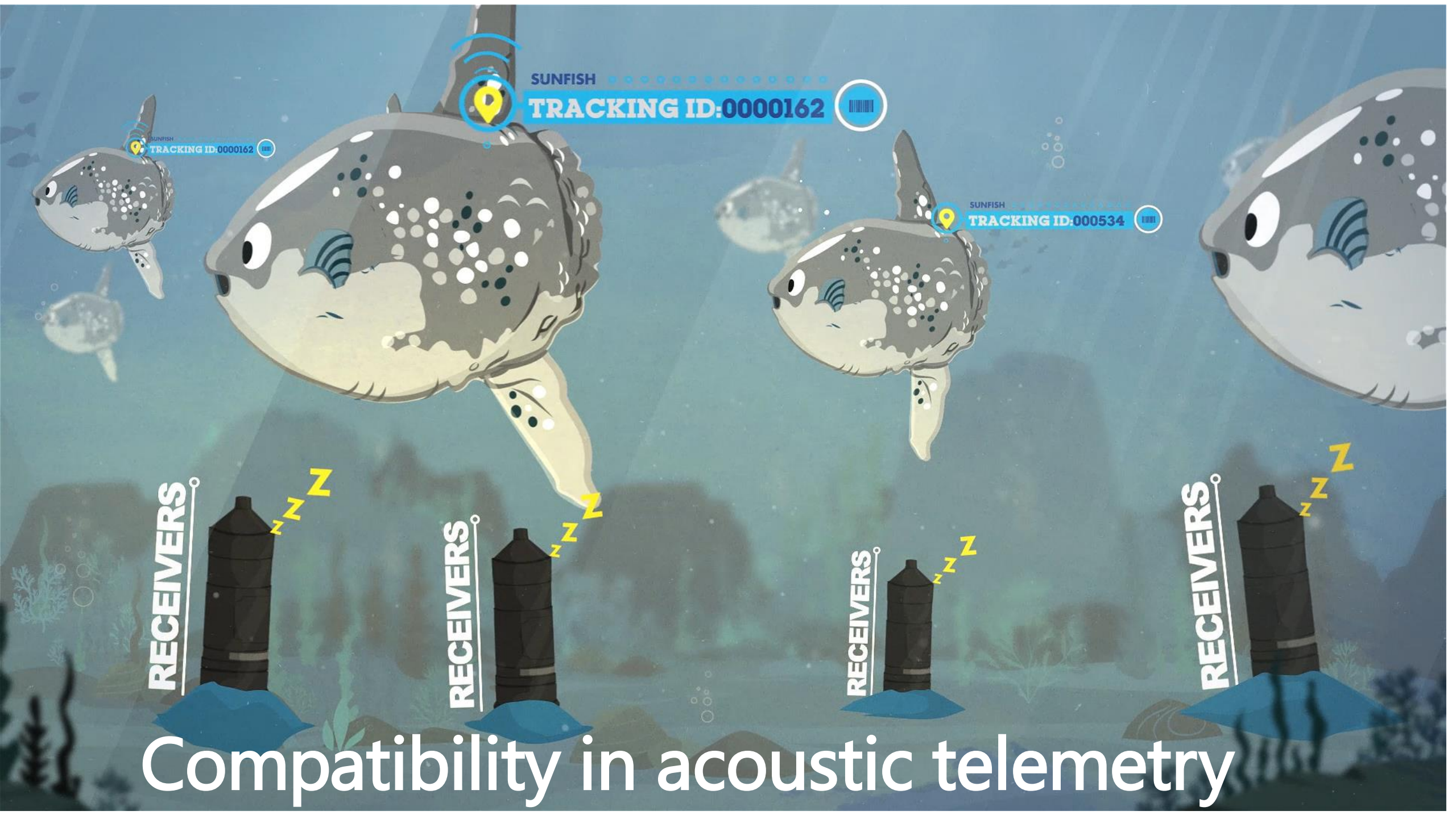
- Identify deployments that require manual checking in the ETN portal
- Get a visual overview of current receiver deployments
- Plan receiver maintenance campaigns

Map



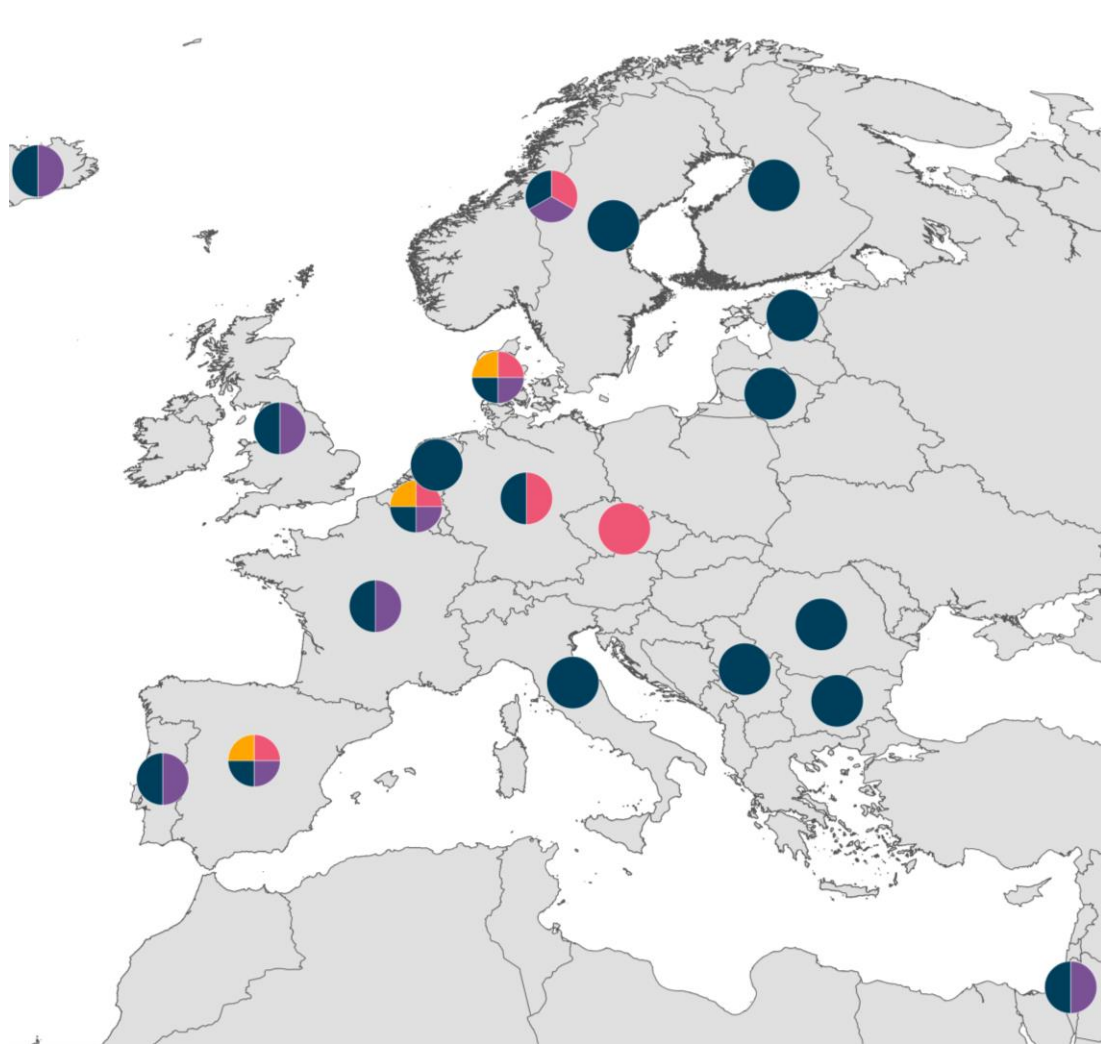
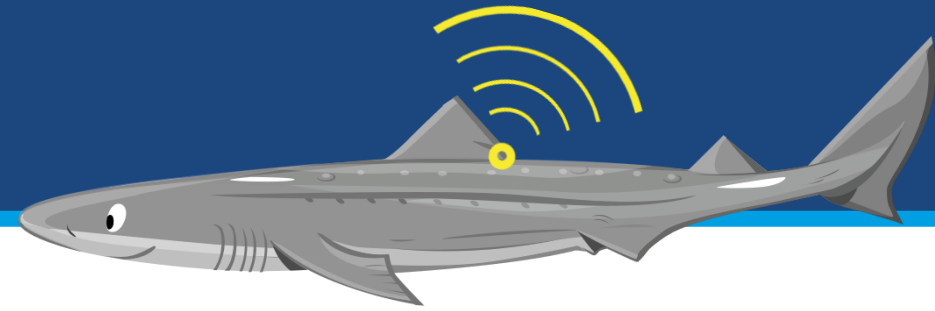


By registering to
ETN you agree to
our Data Policy



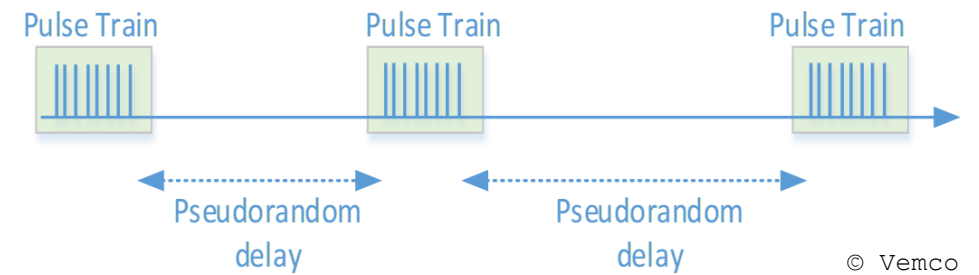
Compatibility in acoustic telemetry

compatibility...

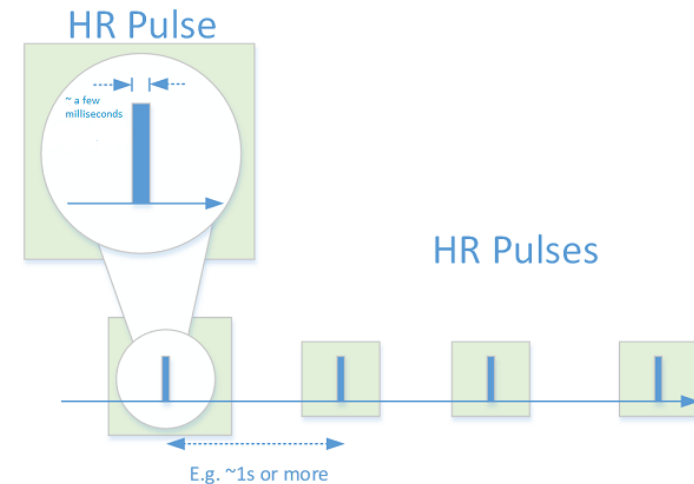


ID transmission technology

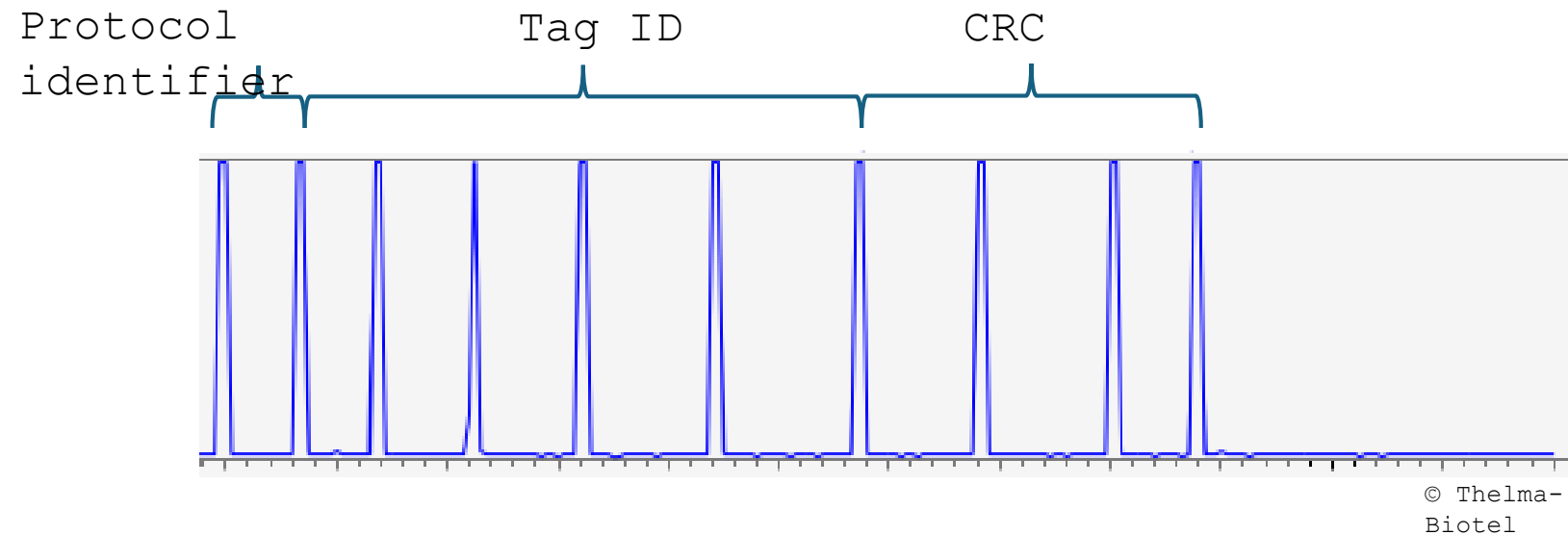
- PPM – Pulse Position Modulation
 - ✓ ubiquitous transmission system
 - ✓ Listens to the time between pulses
 - ✓ works in about any environment:
 - fresh water & marine
 - estuary, coastal, open ocean
 - rocky, sandy, muddy
 - ✓ Code collision







- BPSK – Binary Phase Shift Keying
 - ✓ Listens to the signal
 - ✓ the signal is transmitted as a phase shift on the frequency carrier signal
 - ✓ Very fast → no collision
 - ✓ Doesn't perform well in lower frequencies
 - ✓ Susceptible to multipath



PPM explained

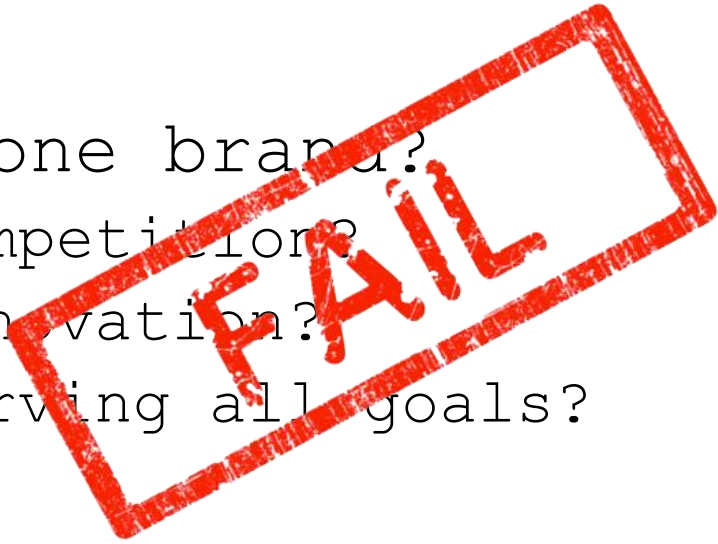


Tag protocols

 115 *	 114 *	 113	 112 <i>(Obsolete - do not use)</i>
A69-1601	A69-1303	A69-1105	A69-1105
A69-1602	A69-1601	A69-1303	A69-1206
A69-9001	A69-1602	A69-1601	A69-1303
A69-9002	A69-9001	A69-1602	A69-1601
A69-9004	A69-9002	A69-9001	A69-9001
A69-9006	A69-9004	A69-9002	A69-9002
	A69-9006	A69-9004	A69-9004
		A69-9006	A69-9005

The solution...

- Use one brand?
 - Competition?
 - Innovation?
 - Serving all goals?
- Use one protocol?
 - open-access code set
 - ID allocation controlled by a third party
 - Describe a standard

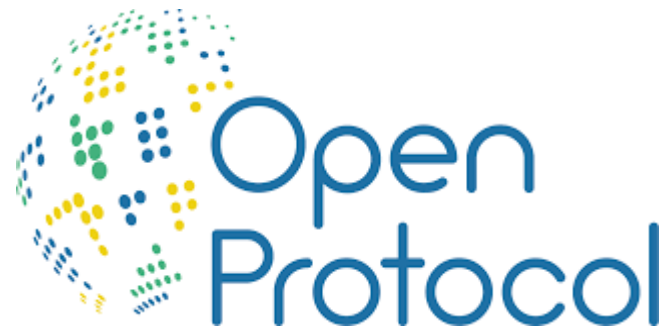


The solution towards compatibility

ETN, together with industry have worked on the development of new open tag protocols, which are available for all telemetry users across the world - this technology is NOT restricted to Europe.

Use open protocols, all brands can join

- open-access code set (after agreeing on the terms of reference and licence agreement)
- ID allocation controlled by a third party
- Small cost associated to the ID allocation



2 robust and energy-efficient transmission protocols

<https://europeantrackingnetwork.org/en/open>

Steps to take

Approve MoU

- Access to IDs

Sign Licence agreement

- Permit to produce tags

Provide metadata to ETN

- Manufact: tags
- Customer: animals



THELMABIOTEL

STAR : ODDI
Logging Life Science

Lotek



INNOVASEA





Protocols

		Protocols			
		ETN protocols		Shared protocols	
		OPI	OPs	S256	R64K

Receivers

Thelma Biotel					
Sonotronics					
Lotek					
Innova sea *	MAP-113				
	MAP-114				
	MAP-115				
	Gen2				



Compatible



Compatible, but Innovasea does not produce R64K tags



Not compatible



Receiver compatible if add-on is purchased



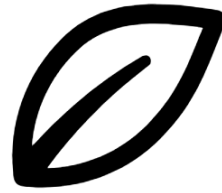
Innovasea does not produce OPI & OPs tags

ETN Recommendations



NEEDS	CASE SPECIFICS	ETN RECOMMENDATION	OUTCOME
I need receivers	My tags are on the R64K codeset	We recommend purchasing receivers from ThelmaBiotel, Lotek & Sonotronics, or a receiver loan from ETN or OTN	Your receivers will detect R64K tags, OPi/OPs tags and S256 tags, without fees.
	My tags are OPi/OPs	We recommend a receiver loan from OTN; if not possible, Gen2 receivers with OP-enabled	Your receivers will detect R64K tags, OPi/OPs tags and Innovasea encrypted tags.
	My tags are from Innovasea & therefore encrypted	Do NOT purchase Innovasea's Nextrak receivers!	Compatibility dead-end
	(Red dashed arrow with 'X' from Innovasea encrypted tags to Nextrak receivers)		
I already own receivers	My receivers are from ThelmaBiotel, Lotek or Sonotronics	Simply do the free OP upgrade	Your receivers will detect R64K tags, and tags on specific MAP113 codesets
	My receivers are Innovasea MAP113	Stay on MAP113 (to avoid fees)	Your receivers will detect R64K tags, and OPi/OPs tags
	My receivers are Innovasea MAP114	Stay on that protocol & pay the fee to make your receivers OP-enabled	Your receivers will detect R64K tags, and tags on specific MAP114 codesets
	My receivers are Innovasea MAP115	Stay on or downgrade to MAP114 if you previously had MAP114 receivers	Your receivers will detect R64K tags, OPi/OPs tags and encrypted Innovasea tags.
	My receivers are Innovasea Gen2	Pay the fee to make your receivers OP-enabled	(Same as MAP115 case)
	My receivers are Innovasea Nextrak	Request that Innovasea make it possible to make your receivers OP-enabled	Your receivers will detect encrypted Innovasea tags only until your receivers are OP-enabled

CARE...



Sign up to ETN!



Or send an empty email to
users-subscribe@europeantrackingnetwork.org

Thanks for listening!



Jan.Reubens@vliz.be
etn@lifewatch.be



<https://lifewatch.be/etn>

<https://europeantrackingnetwork.org/en>

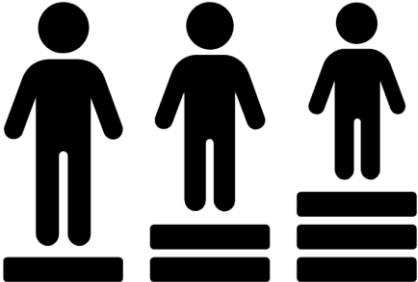
bibliography



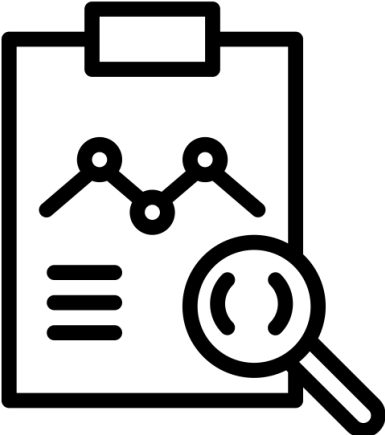
Created by Guilherme Furtado from Noun Project



Created by Gregor Cresnar from Noun Project



Created by Adrien Coquet from the Noun Project



Created by supalerk laipawat from Noun Project



Created by Saiful Rizal from Noun Project