

DEVELOPMENT OF AN AVIAN LEGRING TRACKING DEVICE

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Project funding

This work received funding as an innovative research and development project among a number of Menter Mon work packages. These were to undertake conservation monitoring within a tidal energy testing zone in North Wales.

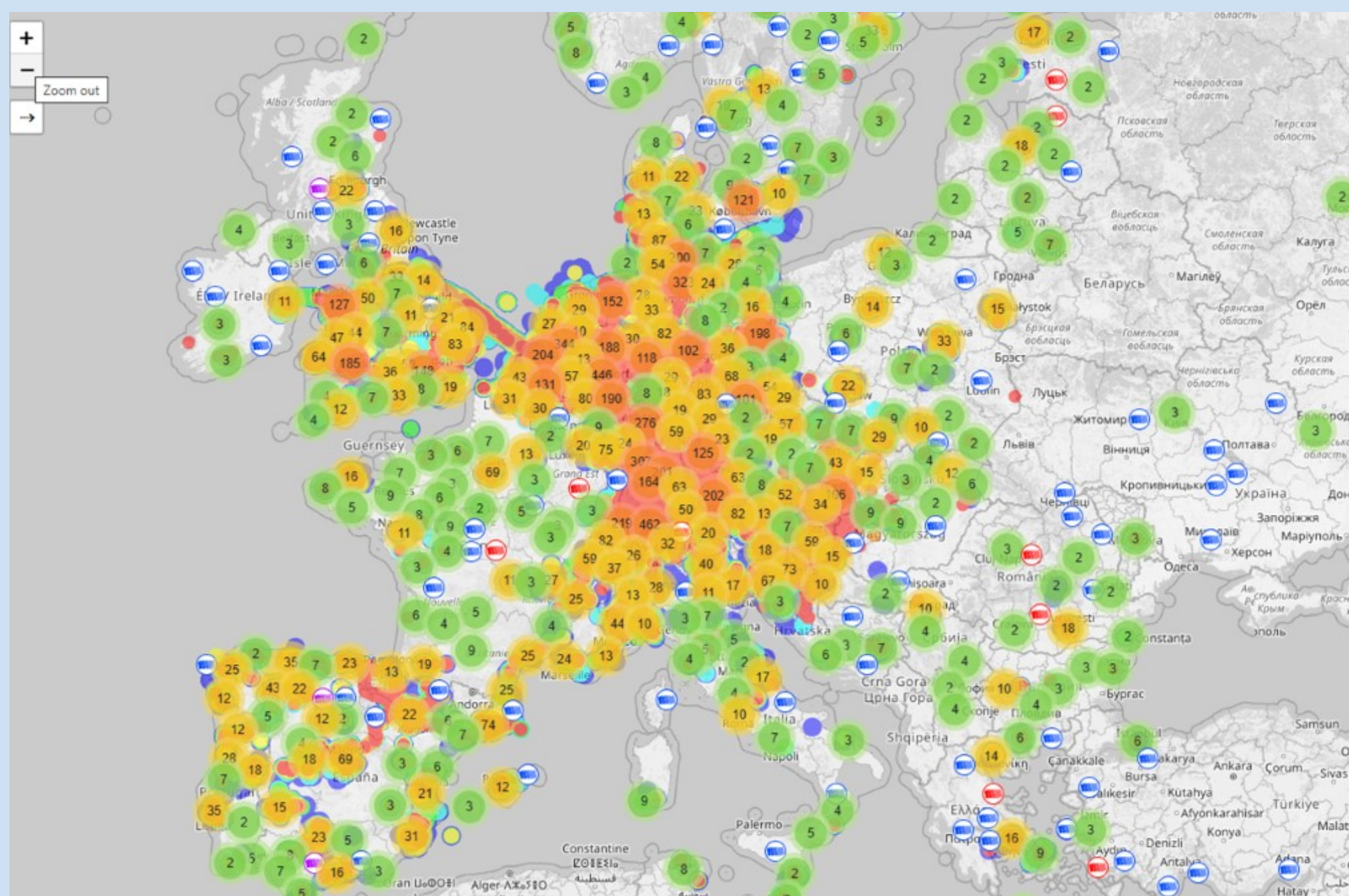


Figure 1. LoRa coverage

Design decisions

Various wireless technologies are available for remote wildlife tracking. Our limitations of bodyweight reduced the options available. Motus is a similar technology but we opted for LongRange radio (LoRa) due to excellent range and also the opportunity to take advantage of the already extensive networks.

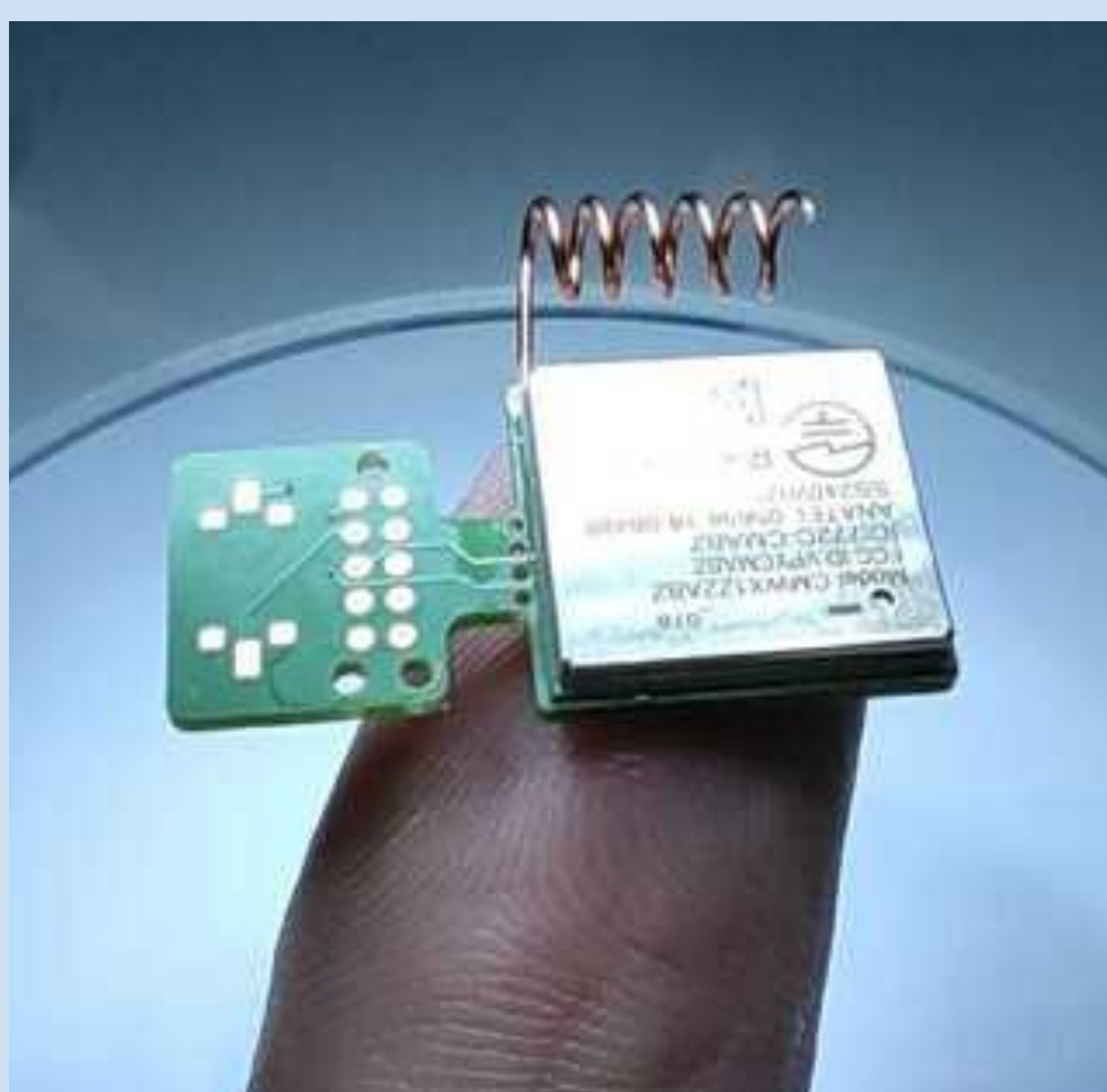


Figure 2. Tracker circuit board with LoRa transceiver and helical antenna

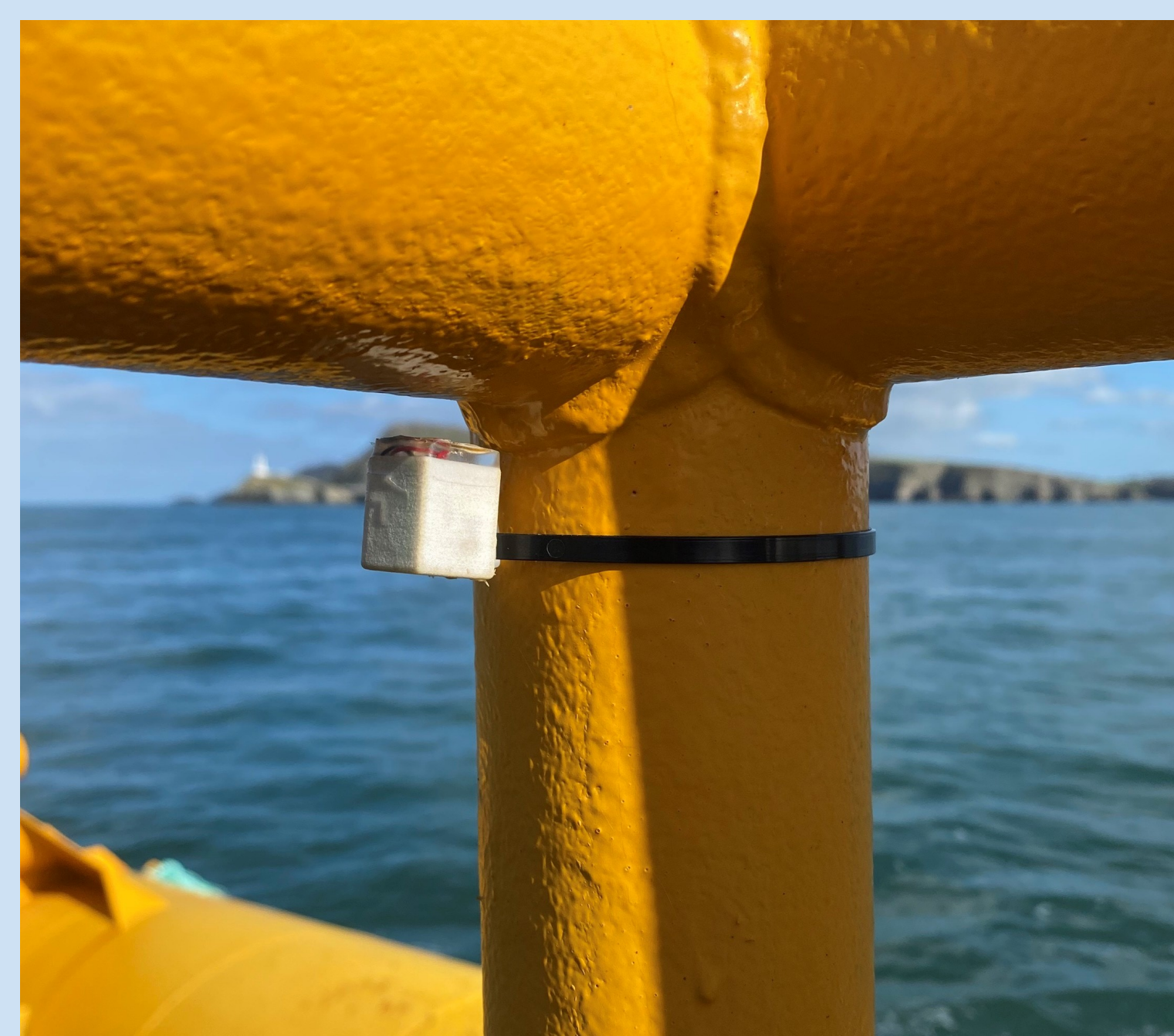


Figure 3. Mk 1 Legring fitted to a buoy at the MDZ

What problem needed solving?

A limitation of current seabird tracking is short temporal deployment durations because the device is attached to feathers with tape or glue. The tag or its attachment feathers generally drop within a number of days. This ground breaking development project was to design a seabird tracking device which would provide longer movement and survival data and be fully integrated into a 3D printed legring. The tag was initially designed for the Guillemot (*Uria Aalge*) for deployment at the Marine Demonstration Zone (MDZ) adjacent to RSPB South Stack on Anglesey.

Initial results



Figure 4 and 5 Guillemot with legring attached

Tags were fitted to a offshore buoy at the MDZ in 2023. Five tags were fitted to Guillemots in June. Data was received from all tags (min/max) 8-68 days with excellent solar charging performance. We await birds return in 2025 to assess tag durability.

Tag reliability MDZ Buoy Oct 2023 to present	
Peak battery voltage	4.21V
Minimum voltage	3.61V
Transmissions received	17094

Guillemot Tag 1 Deployed 26/06/2024	
Voltage at deployment	3.807V
Most recent data	01/09/24
Voltage at last check in	4.239V
Transmissions received	240

How does it work?

A locational estimate is derived by signal strength (RSSI) if transmissions are received by one or more LoRa receivers (gateways). If the receivers contain GPS they can estimate a more accurate location using time difference of arrival (TDoA) when three or more receive the information. Four receivers were installed along the coast at the project site. Six gram tags were built and set to transmit hourly although this can be changed remotely.

What next for the legring?

Maximum range tests to confirm >10 kms observed on other LoRa projects and undertake some TDoA accuracy measurements. Consideration being given to incorporate GPS onto the ring around the weight limitations.