

Project Name: Bioacoustic Monitoring for baseline and long term surveys

Project Location - 8 sites across the UK

Insert names of Client(s)/Organisation(s): AtkinsRéalis and Wilder Sensing

BIG Biodiversity Challenge Award Category: Innovation Award

Project overview (50 words max)

- AtkinsRéalis and Wilder Sensing trialled the use of bioacoustics and the automated analysis of very large volumes of audio files using Machine Learning for birds across a number of sites in 2023 and 2024. We were able to generate over 300,000 species level records from over 150 species of birds.

What were the biodiversity conditions on site prior to the enhancement? (100 words max)

The sites surveyed ranged from pre, mid and post development stages and included a new railway, an active quarry and linked nature reserve, and potential functionally linked habitat near to a coastal Special Protection Area. A diverse range of habitats were present on site, particularly hedgerow, grassland, scrub, woodland and wetland. We were able to demonstrate large scale analysis of bioacoustics can deliver significant benefits through significantly enhancing site surveys.

What were the reasons behind this project? (100 words max)

- AtkinsRéalis recognised that automation of bioacoustic data analysis could innovate the way in which baseline and on-going monitoring could be carried out. The current approach of on site surveys is costly and often not consistent as the results will depend on the site conditions on the day and the experience of the ecologist, giving at best a snapshot of what is present.
- The ability to provide customers with low cost, auditable, high quality data could significantly improve the way surveys are designed and delivered.
- A number of sites were selected across the UK to evaluate the approach.



Audio recorder being installed. Credit Wilder Sensing

What were the biodiversity measures taken? (300 words max)

Eight sites across England were selected ranging from active quarries, biodiversity offset sites and long term monitoring sites. A number of different habitats were selected to trial short and long term biodiversity monitoring of bird species using bioacoustics.

Up to seven audio recorders were deployed at each site alongside site surveys and subsequent record validation by listening to audio files where a species had been automatically identified.

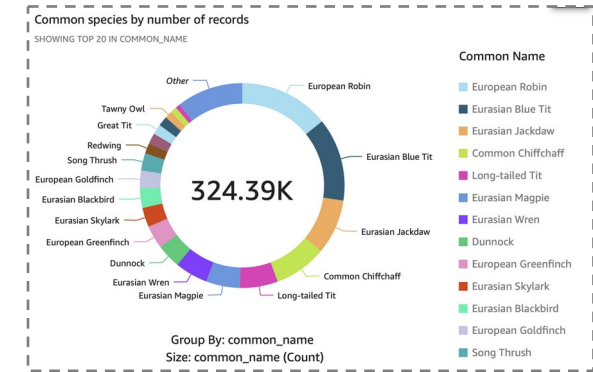
The surveys generated over 324,000 species level records, with unusual records being manually validated. This generated an exceptional volume of species level data. The results, and their subsequent validation, showed that accurate short and long term surveys can be significantly supplemented with bioacoustics and a number of species were identified that were not detected by traditional survey.

The approach is repeatable in any habitat and the results were accurate based on manual validation.

In future the approach has a wide range of biodiversity applications such as cost-effective annual monitoring, developing habitat health indices based on soundscapes and better targeting and monitoring of habitat creation/enhancement measures.

Work is underway to broaden out the taxa that can be analysed by the AI including bats and fish species as well as triangulation to identify the number of individuals present.

AtkinsRealis staff ran the various pilot sites in addition to their normal survey work



Summary results from trial sites. Credit Wilder Sensing

Count by sensor

common_name	device_serial								Total Count
	SMM07191	SMM07154	SMM07153	SMM07149	SMM07147	SMM06359	SMM06312	Count	
Carrion Crow	96	35	36	40	57	144	54	462	
Coal Tit	28	12	12	133	2	33	15	235	
Common Buzzard	163	70	531	416	402	357	25	1,964	
Common Chaffinch	180	149	66	12	56	39	1	503	
Common Chiffchaff	5,332	2,356	6,822	2,953	583	2,325	1,125	21,496	
Common Cuckoo	1	4	4	3		5		17	

Sample species level screenshot by recorder
Credit Wilder Sensing

Further information (250 words max)

Wildlife Acoustic recorders were deployed to record 24/7 at 48kHz with the batteries and memory cards being replaced every 7 days or when site visits permitted.

Depending on the site specific survey requirements recording lasted from 2 weeks to 18 weeks and typically generated hour long files.

The audio files were uploaded to the Wilder Sensing website by AtkinsRéalisis ecologists where they were analysed in 3 second intervals with a hour file taking 20 seconds to process. Any bird call recognised resulted in a record being generated with a confidence rating reflecting how certain the Artificial Intelligence was in the recognition.

A total of 166 species were reported although a small number of species were false positives, which were subsequently manually removed.

This project has shown that this technology can be widely deployed and is now starting to be adopted by NGO's, Land Owners, and government agencies such as with a good example being: <https://www.bbc.co.uk/news/uk-england-somerset-68272632>

Project Team

- 6 Ecologists from AtkinsRealis on different sites and 2 staff from Wilder Sensing

What was the motivation for carrying out the enhancement? (100 words max)

Emerging new technologies could provide an opportunity to go beyond normal practices although many hadn't been proven to work for professional ecologists at especially at scale. We decided to innovate using bioacoustics and AI in the aim of provide a step change in the volume and quality of the data available to us with which to inform decisions on biodiversity through impact assessment to mitigation and compensation, in particular to inform more effective future habitat management approaches.



Audio recorder working 24/7. Credit: Wilder Sensing