

Case study: Cornwall Wildlife Trust

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Project Partner

Cornwall Wildlife Trust (CWT) is the leading local charity working to protect and enhance Cornwall's wildlife and wild places. They are passionate about all aspects of nature conservation and work only in Cornwall. Cornwall Wildlife Trust wants to see Cornwall richer in wildlife, cared for and appreciated by one and all. The Trust is guided by our mission to rebuild biodiversity and engage everyone with the natural environment. The Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS) collates, manages and disseminates wildlife and earth science information relating to Cornwall and the Isles of Scilly.

Project Rationale

Hedgerows are a characteristic and integral feature of the British landscape, yet they are poorly represented in existing maps (both paper and digital). Lidar (light detection and ranging) techniques can provide detailed, large-scale data of the height of landscape features, including hedgerows. Cornwall Wildlife Trust (CWT) do not have a full inventory of hedgerows in the county, such as their structure or distribution, and there is limited knowledge of the distribution of the local 'Cornwall hedgerows' — shrubs and trees growing atop a low wall (often with accumulated earthen ramparts). A mapped inventory of hedgerow features would enable CWT to monitor any future losses of hedgerows, target hedgerow restoration or replanting, and relate hedgerows to their data holdings of the distribution of plant and animal species across the county. CWT would also be able to utilise the hedgerow inventory in planning consultations, to ensure that important hedgerow features and network links are conserved, enhanced, or managed for the public good and to benefit wildlife.

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Methodology

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The Tellus South West lidar data consists of 5 x 5 km tiles (squares) of gridded 'raster' data, made up of 1 x 1 m grid cells, covering the whole of Cornwall. Each grid cell contains a height value, representing the elevation of surface features above sea level, such as buildings, trees and hedgerows in one coverage (a DSM — Digital Surface Model), and the ground surface elevation in another (DTM — Digital Terrain Model).

To extract the actual height values of surface features, e.g. the height of a tree above the ground, the DTM is simply subtracted from the DSM. This creates a new coverage — a Canopy Height Model (CHM), depicting the height of all features relative to ground level, which is represented as a flat surface.

To extract hedgerows from the CHM, it was first necessary to remove all non-hedgerow features that overlapped in height values, such as blocks of woodland, houses, farm buildings etc. This was achieved using existing datasets that had already mapped these features, enabling them to be masked out of (removed from) the CHM. This would leave mostly hedgerows as the above-ground features.

Results

The hedgerow map gave a convincing representation of the hedgerow network of the entire county of Cornwall, with associated areas of scrub and non-woodland trees. Classified and filtered by height, the map depicts the habitat network across the Cornish landscape for the very first time, and in unprecedented detail. However, some unwanted features remained in the map. It was not possible to remove some semi-permanent structures, for example caravan parks and chalets. CWT and ERCCIS are currently removing all these unwanted features to improve the accuracy of the final map.

The distinctive 'Cornish hedges' could not be identified in the lidar data, as the stone base could not be picked out below the hedgerow canopy. However, classifying the hedgerows by height, starting with a specific category of 1-1.5 m, was expected to include most of the 'bracken hedges' or stone walls without shrubs. The classification of 1.5-3 m was expected to contain managed hedgerows, while the 3-6 m category would likely contain unmanaged or derelict hedgerows. The tallest category (6 m and above) was expected to contain non-woodland trees, and former hedgerows which had been left unmanaged and developed into tree lines.

Future Opportunities

The hedgerow mapping exercise was an excellent example of how the Tellus South West lidar data can be exploited for multiple purposes by multiple groups, to provide research, planning and commercial opportunities. The true strength of the Tellus data is the extensive and detailed coverage — including all of Cornwall (and most of Devon) at 1 x 1 m resolution. Using standard processing methods and readily available data sources, a highly detailed data product could be generated that depicted the full network of hedgerows and woody vegetation across the entire landscape. This is a first for any part of Britain, and offers huge scope for future academic research and environmental planning, by CWT and other stakeholders with access to similar data.

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