Pools of water are typical of an intact raised bog. Photo: WSI

# Saving the last one per cent

Clare Barber recounts how conservation of Europe's dwindling peatlands is being aided with a low-cost, high-accuracy toolkit based on Collector for ArcGIS

Ireland—the name is synonymous with lush green wetlands and raised bogs, sometimes also called peatlands. But in a country noted for its lush greenery, just 1% of the raised bog landscape remains in a near natural state.

"99% of these areas have been lost due to drainage associated with peat cutting or conversion to agricultural land," says Dr. Patrick Crushell, director and senior consultant of Wetland Surveys Ireland (WSI)[1], a professional environmental consultancy based in Kenmare, County Kerry. "It's a big battle to conserve peatlands in Ireland but the pressure from Europe to do so is substantial," he adds. The reason why is that they represent Europe's last remaining peatlands and exemplify some of the world's best peatland biodiversity. Peat is also an ecosystem for purifying water and helps naturally mitigate flooding through water absorption.

## Monitoring the one per cent

Monitoring the health of these wetlands requires the extremely accurate collection of vegetation data over a long period for comparison purposes. Surveyors, such as those employed by WSI, monitor the growth or decline of certain indicator species such as Sphagnum mosses. Crushell explains: "A high coverage of these species implies the area has sustained its water table—and sustained it throughout the year. It implies it's in good condition, or not drying out."

Ireland's National Parks and Wildlife Service[2] recently asked WSI to gather and provide sub-meter accuracy data for its vegetation monitoring. "Having this extra level of accuracy supports the evidence base that will convince policy makers of the need to conserve these last remaining areas," says Crushell. And while WSI had used all-in-one monitoring devices in the past for data collection, they had proved expensive and required replacement every few years. "They weren't future proof," notes Crushell.

Against this background, WSI sought a more sustainable, future-proof solution ... one that would allow field personnel take advantage of the devices and software they already used.

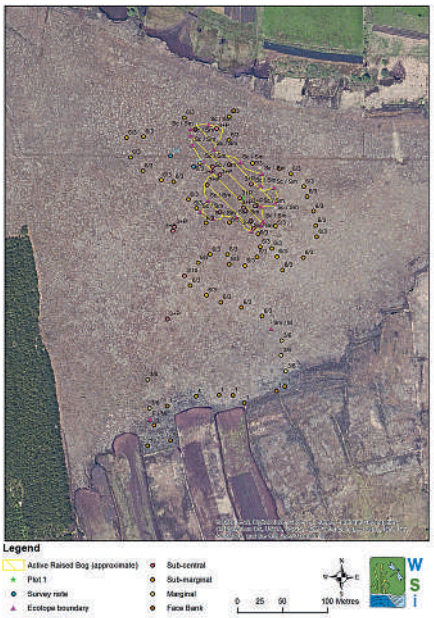
## A tried-and-tested app

For the past five years, WSI had been using iPhones and iPads with Esri's Collector for ArcGIS to record field data. Its staff were already familiar with the Collector interface and particularly liked the ease with which they could input large quantities of text notes. As such, WSI had a strong preference to continue using Collector on its iOS devices. There were other reasons too, says Crushell. "You don't have to replace your device every few years; the software is continuously updated; it works on any device in our pocket, and the iPhone touch screen is less cumbersome than some other devices." Not least, Collector makes it easy to create forms on iOS devices.

Another big advantage, says Crushell is that Collector permits working in disconnected environments. "In peatlands, you're in the middle of nowhere most of the time, with limited cell phone coverage. With Collector, we can access our data offline, view aerial imagery, record data and synch it at the end of the day when back

Blanket Bog landscape, note the bright red coloured Sphagnum moss in the foreground. Photo: WSI


Patrick Crushell using Collector and the Arrow 100 in the field Photo: WSI.




Map showing the results of a recent WSI survey of a raised bog. The uniform light-brown colour represents the high bog surface, with the most pristine area of the bog (highest-quality active raised bog) is indicated by the yellow hatched polygon. Peat cutting (for fuel) extends into the bog from the edges to the north and south. Image: WSI

at the office. It's something we do all the time."

The only downside was that the iOS GPS chip provided locational accuracy to little better than five meters. To satisfy the National Parks and Wildlife Service's new requirement for sub-meter accuracy, WSI needed a suitable solution and ideally one that could override the iOS devices' native location data and communicate with Collector.

## Hitting the bullseye

After extensive product evaluation, WSI tested the Arrow 100 GPS receiver in a week-long trial survey of remote blanket bogs in western Ireland. The Arrow 100 is made by EoS Positioning Systems of Canada[3], a provider of extremely high-accuracy GPS/GNSS receivers and related apps and an Esri Silver Tier partner.

WSI worked with Eos's UK distributor, MGISS[4], to acquire the small, portable receivers that operate with the European Geostationary Navigation Overlay Service (EGNOS), a free European satellite-based augmentation system[5]. In operation, the Arrow 100 receives a differential correction signal from EGNOS, sends this to the iOS device via Bluetooth, and automatically overrides the device's native GPS with this far more accurate positional data.

Indeed, during the trial survey, field personnel consistently reported accuracy levels of between 0.2 and 0.7 meters. In practical terms, this means the team can measure the location of, say, Sphagnum moss and return weeks, months, or even a year later with the certainty that they are within a meter of the spot previously surveyed. "An accuracy level of five meters would skew our results quite seriously, so this five-fold improvement eliminates uncertainty in our monitoring and builds a higher degree of confidence," says Crushell.

In addition to accuracy, WSI noticed that Collector and Arrow 100 communicated easily through Bluetooth, and that its battery lasted all day. "This saves us a fortune," enthuses Crushell, who is even more pleased that the solution is future proof and won't need replacing any time soon."

Today, WSI continues monitoring the health of the bog ecosystem with Collector, iOS, and Arrow 100, ensuring progress in the fight to conserve Ireland's last remaining wetlands.

"Overall, we are very happy with the operation of the solution," concludes Crushell. He accepts that while the cost was significant, it was still more affordable than purchasing a stand-alone device running a proprietary operating system and software and which, as he notes, would have failed to generate a Return on Investment.

## Web Links

[1].*http://www.wetlandsurveysireland.com*
[2].*https://www.chg.gov.ie/heritage/national-parks-wildlife/*
[3].*www.eos-gnss.com/en/*
[4].*https://mgiss.co.uk/*
[5].*https://www.egnos-portal.eu/*

***Clare Barber is Sales and Marketing Executive at MGISS based in Liverpool (http://mgiss.co.uk)***