

Science for Environment Policy

Data gathered by the public on UK butterfly populations could be useful for conservation

Researchers have compared the findings of a citizen-science project and a long-running butterfly monitoring scheme in the UK to gain insights into the reliability of data gathering by the public. They found that — contrary to the scepticism with which such projects are sometimes viewed — much of the citizen-recorded data agreed with the findings of more formal monitoring, particularly for species often found in gardens. This indicates that mass-participation sampling not only provides a valuable tool for public engagement, but, in this case, could also provide valid data to inform butterfly conservation.

Biodiversity conservation is one of several scientific disciplines that has begun to employ [citizen science](#) (public participation in research), which is promoted by the European Commission, for example in the [Horizon 2020](#) programme. Some instances of citizen science comprise systematic, long-term studies, while others rely on less structured, opportunistic sampling methods. The latter reduce barriers to participation (e.g. time commitment and prior knowledge needed), potentially increasing the number of people involved; however, the resulting data may lack credibility, note the researchers — in other words, there may be trade-offs between public engagement and scientific rigour.

This study investigated this trade-off by comparing species population trends identified in a citizen-science project in the UK (the [Big Butterfly Count – BBC¹](#)) with results from the long-term, systematic [UK Butterfly Monitoring Scheme](#) (UKBMS). Such comparisons of monitoring data have rarely been carried out before, say the researchers, but are useful to demonstrate whether data from a citizen-science scheme is valid.

Launched in 2010, the BBC is an annual survey of butterflies that seeks to increase public awareness of, and interaction with, nature, while gathering data on species abundance. The simple sampling protocol requires participants to record how many of 18 species of butterfly and two species of moth they see during a 15-minute period in the daytime, over three weeks in late July to early August (when butterfly numbers are at their peak). No training is provided and sightings are submitted online. Most counts take place in gardens.

In 2013–2015, an average of 47 636 people participated each year. While this shows that the aim of mass participation was met, the data may not give an accurate indication of butterfly population change, according to the researchers. For example, as the survey runs for only three weeks, variation between butterfly numbers found in each year may be due to differing phenology (plant and animal life cycles, related to weather and seasons), rather than real changes in populations. Changes observed could also be due to varying efforts by participants.

The UKBMS², meanwhile, has been running since 1976. Weekly counts are conducted along transects (fixed routes) five metres wide and two to four kilometres long, mostly between April and September, at more than 1 000 sites, mostly in semi-natural habitats (e.g. managed broadleaf woodland). The recorders walk along the route at specific times of day. High levels of identification skill are required as more than 50 species are surveyed; therefore, recorders tend to be experienced amateurs or professional conservationists. The high-quality data produced are used to calculate population trends, and are used as biodiversity indicators by government and in scientific research.

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1. The BBC is run by Butterfly Conservation

2. The UKBMS is operated by the Centre for Ecology & Hydrology, Butterfly Conservation and the British Trust for Ornithology.

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The study compared data from the UKBMS taken in the same period as the BBC, for the 18 species observed in the BBC. The study then assessed whether the BBC data from 2011–2014 could predict the same trends as found in the UKBMS, taking phenological patterns into consideration. For example, it was shown that the peak flight period for the gatekeeper butterfly (*Pyronia tithonus*) came in the middle of the BBC recording period in 2011 and 2013, but later in the recording period in 2012 and at the beginning in 2014, which would affect sightings.

The results showed significant similarity between species population changes found in both schemes for 2011–2014, with 11 of the 18 species increasing in abundance in both the BBC and UKBMS, though the increase was less marked in the BBC. Three species in the BBC and six in the UKBMS showed a decrease over this period.

Interestingly, the BBC data, in conjunction with weather variables (e.g. spring temperature) and statistical methods, could be successfully used to model (predict) the 2015 findings of the UKBMS for 13 species. In addition, the BBC population trends correlated well to trends observed for seven species by the UKBMS over the period 1980–2015. These predictions were good even for species that are not easy to differentiate (e.g. three types of *Pieris*, 'white' butterfly, were recorded).

Poor similarity between BBC and UKBMS data tended to be for species that were least recorded in the BBC, perhaps due to low population densities in gardens. The researchers suggest that encouraging participants to record species in other environments, for example heaths or woods, might, therefore, address this discrepancy.

The researchers acknowledge that the study deals with a conspicuous and popular type of insect, and is limited to 18 species; projects like the BBC are unlikely to be able to provide data on the large number of threatened, less well-known species. However, the significant correlation between data from these two schemes shows that mass-participation science has, in this case, produced some reliable data. This indicates the potential for citizen science in recording biodiversity in urban areas, complementing scientific sampling in other habitats. The BBC could also provide a biodiversity indicator for butterflies in gardens and parks. While common species are not of high conservation priority, monitoring them is important for understanding drivers of their general decline.

Another positive aspect of citizen science is its relatively low cost — BBC running costs (mostly related to promotion) are about a quarter of those of the UKBMS. However, these costs are not directly comparable, as far more species are recorded by the latter. Nevertheless, the researchers argue that the informal education provided by mass-participation science may help to develop a pool of skilled, engaged volunteers, who may in future contribute to scientific monitoring work. They propose that in this example, citizen science is win-win — achieving scientific outreach and meaningful scientific output.

