Terrestrial Insect Abundance – Butterflies

Butterflies are a familiar sight in the summer months across Scotland. Some use a wide range of habitats (generalists) – these include species such as meadow brown and small tortoiseshell, commonly found throughout Scotland. Others are specialists that are more restricted and may be found only in one specific habitat such as large heath, which is typically a wetland species. Butterflies are relatively well-recorded, which enables their population trends to be assessed. Changes in their numbers over the years can provide an indication of habitat loss and fragmentation, and the impacts of climate change.

Evidence

In Scotland, butterflies are monitored through the Butterfly Monitoring Scheme (UKBMS) [www.ukbms.org]. Volunteers walk fixed route transects weekly from April to September each year. The indicator describes trends for 20 of the 34 regularly occurring butterfly species in Scotland at 519 sample locations.

Scottish butterfly population trends (1979-2018)

UKBMS for Scotland

Assessment

Since the start of the time series in 1979 to the most recent assessment in 2018:

- The all-species, specialist and generalist species long-term trends were classed as stable.
Commentary

Butterfly populations can show large natural fluctuations. These are mainly due to environmental features, especially weather conditions. Long-term changes in abundance and distribution have been linked to a range of factors including habitat loss and fragmentation, land use changes, and climate change (Asher et al., 2001; Burns et al., 2016). Overall, butterflies in Scotland show no overall change, with the benefits for established or expanding species brought about by the warming summer climate and positive habitat management, being balanced out by the negative effects of warmer and wetter winters, and negative land management practices in some habitats. Scotland’s Pollinator Strategy (https://www.nature.scot/pollinator-strategy-2017-2027) is helping through a large number of projects and raising awareness to boost populations of pollinators such as butterflies.

Butterflies continue to shift northwards in distribution in response to climate change (Mason et al. 2015). Generalist species benefitting from climate change, expanding their range northwards into southern Scotland; these include small skipper, Essex skipper (Fox et al., 2007; 2015,) and most recently white-letter hairstreak. Three range expanding and/or more southerly distributed generalist butterflies show climate-driven, significant long-term population increases - ringlet, peacock and orange-tip. In addition, the small heath has also increased significantly on monitored sites and is performing better in Scotland than across the UK as a whole. Regular migrant butterflies, including the red admiral are also increasing in abundance in the long-term as a response to recent warming. Generalist butterflies are faring better in Scotland than in England, with moderate long-term declines in England compared with no significant change in Scotland. The result suggests that environmental factors have deteriorated more so in England and/or the impact of climate change is having different effects in the two countries (Fox et al., 2015). Generalist species in long-term decline include the small tortoiseshell.

Scotland’s specialist butterflies show no overall change since 1979. One specialist butterfly species, grayling, declined significantly, while the small pearl-bordered fritillary and pearl-bordered fritillary increased significantly. Habitat loss, climate change, urban development and increased nitrogen deposition, are all linked to declines (Asher et al., 2001, Dennis et al., 2017; Franco et al., 2006; Harvell et al., 2002; McDermott Long et al., 2017, Wallis de Vries & van Swaay, 2006) There is evidence that increased nitrogen deposition and warmer temperatures increases spring plant growth resulting in shading and cooler temperatures at soil level (Feest et al., 2014). Paradoxically, this means species that overwinter as eggs or larvae do not benefit from the increased temperatures (Wallis de Vries & van Swaay, 2006). Settele et al. (2008) showed that the effects of climate change were likely to be negative for butterflies with a northerly distribution, with predicted long-term range contractions at the southern edge and/or at lower elevations.

Source data and updates

This indicator is a multi-species index compiled by Butterfly Conservation and the Centre for Ecology & Hydrology, using data primarily from the UK Butterfly Monitoring Scheme (UKBMS). Since 2018 an improved Generalised Abundance Index method (GAI) method has been used to calculate species indices (Dennis et al., 2016), whilst trend smoothing methods were unchanged. The GAI uses all butterfly counts collected at UKBMS sites (303) and randomly selected 1km squares of the Wider Countryside Butterfly Survey (213). By using more data, the GAI produces more representative trends for Scottish butterflies, which may lead to differing results from previous assessments.

References


http://www.snh.gov.uk/indicators/