

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, found commonly 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.

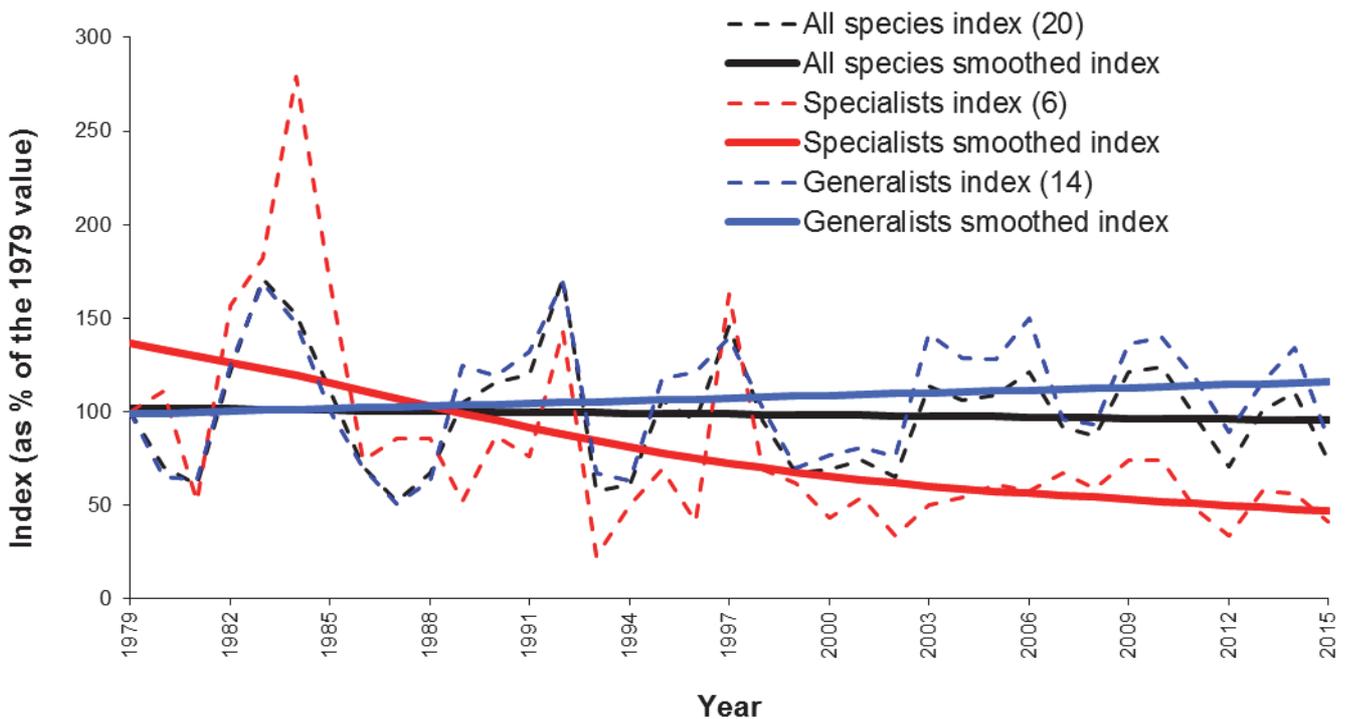


Pearl-bordered Fritillary
 © Jim Asher

Evidence

In Scotland, butterflies are monitored through the [UK Butterfly Monitoring Scheme \(UKBMS\)](#). 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 438 sample locations.

Scottish butterfly population trends (1979-2015)
UKBMS for Scotland



Assessment

Since the start of the time series in 1979 to the most recent assessment in 2015:

- The all-species and generalist species long-term trends were classed as stable.
- Specialist butterflies have shown a significant and progressive decline of 66% from 1979-2015.

Trend	All Species – Stable Generalist – Stable Specialist – Declining
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Data confidence	Good/Satisfactory
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Commentary

Butterfly populations can show large natural fluctuations. These are mainly due to environmental factors, 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).

Some generalist butterflies may be benefitting from climate change, expanding their range northwards into southern Scotland; these include small skipper and Essex skipper (Fox *et al.*, 2007; 2015). Three generalist butterflies show climate-driven, long-term population increases – peacock, ringlet and orange-tip; whilst the small heath and Scotch argus have also increased on monitored sites. Regular migrant butterflies, including the red admiral are also increasing in abundance in the long-term as a response to recent warming. Wider countryside butterflies are generally faring better in Scotland than in England. Since 2003 the trends for both countries diverge, suggesting either that environmental factors have deteriorated more rapidly in England or the impact of climate change is having different effects in the two countries (or both) (Fox *et al.*, 2015).

Scotland's specialist butterflies have declined by 66% since 1979. One specialist butterfly species, grayling, declined markedly, while the pearl-bordered fritillary increased. Butterfly Conservation volunteers are involved in habitat management projects across Scotland, which benefits a number of species including pearl-bordered fritillary. 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 \(UKBMS\)](#). Annual indices for (habitat) specialist species at each site were calculated using modelled summed weekly count data over the season (Rothery & Roy, 2001). In 2013 an improved analysis method was applied to the measure for generalist (wider countryside) species (Dennis *et al.*, 2013). This uses all butterfly counts collected at UKBMS sites (229) and randomly selected 1km squares of the Wider Countryside Butterfly Survey (209).

References

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