



Northern brown argus
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Northern brown argus *Aricia artaxerxes* F.

Climate Change Sensitivity:

HIGH

Ability to Manage:

MEDIUM

Non climatic threats:

MEDIUM

Vulnerability:

HIGH

Summary

The northern brown argus has been declining over the last thirty years due to loss of habitat and changes in land management. Its range has also contracted in a manner consistent with recent warming. The threats from climate change are exacerbated by its poor dispersal ability and potential hybridisation with the brown argus *A. agestis*, the range of which is expanding.

Altering the management of sites through changes to the timing and intensity of grazing and the management of scrub are likely to mitigate on-site vulnerability to a degree, but off-site action to promote natural dispersal will also be required to safeguard the species in the UK. Translocation to establish colonies in areas where the climate will remain more suitable and that are beyond the natural dispersal ability of the butterfly should be considered.

Description

The northern brown argus is a small butterfly with a silvery appearance when in flight. When basking, it is a deep chocolate brown, fringed with white. Orange spots just inside this white fringe are clearly defined and bright orange on the hind wings, but relatively pale on the forewings.

The sexes can be distinguished by the orange spots around the edges of the upper wings, which extend to the leading edge of the forewing in the males, while in the females the spots are very pale or absent at this point.

Colonies in northern England are of the subspecies *salmacis*. The central spot on the upper side of the forewings in this sub-species is dark brown or black sometimes with a pale white edge to the spot. This differentiates it from the subspecies *artaxerces* found in Scotland, which has a distinctive white spot on the upper side of the forewings.

Ecology and distribution

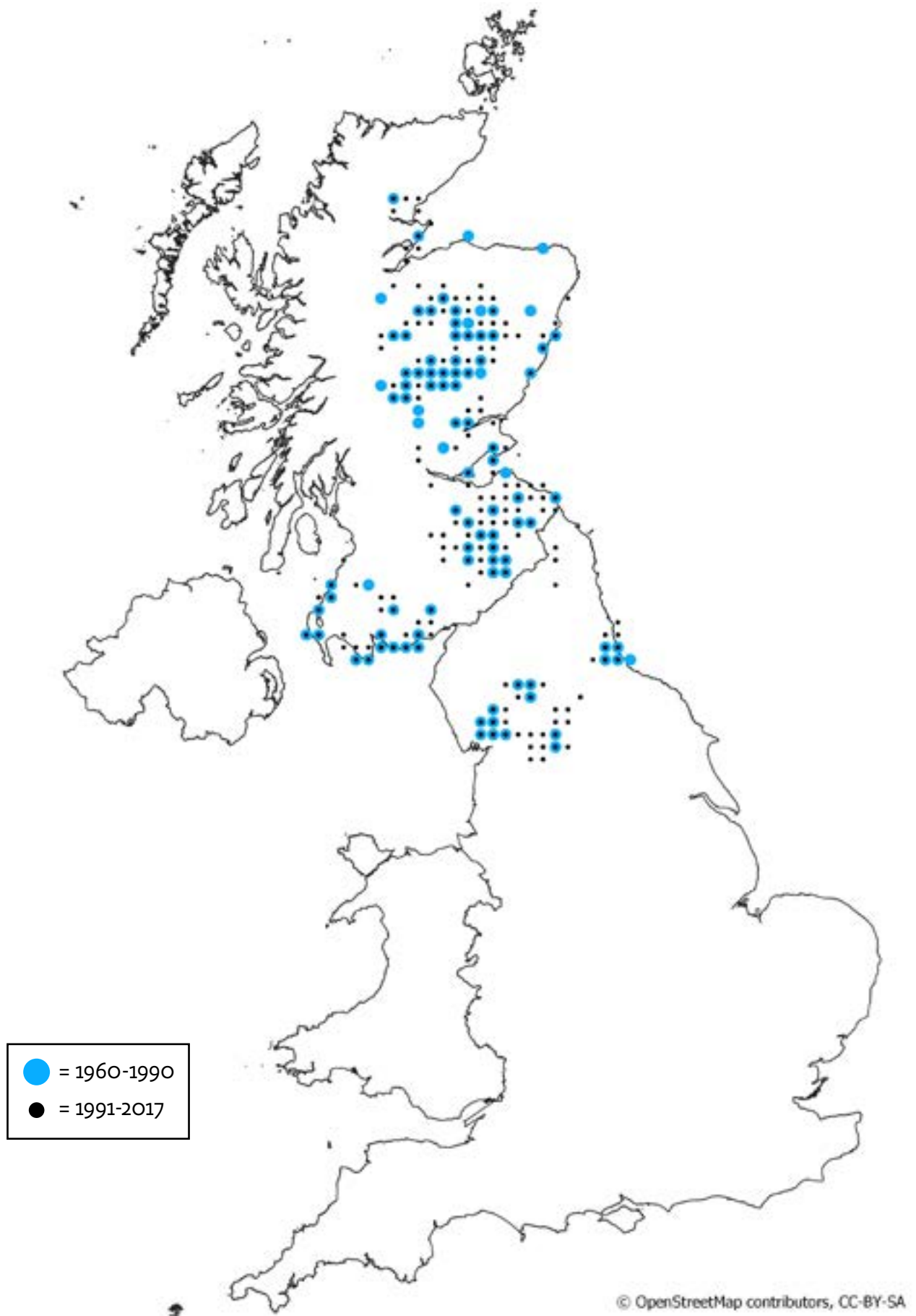
The northern brown argus occurs on thin soils that are usually south-facing and up to 350m in altitude. It is relatively widespread, but localised in northern England and Scotland. It is found in well-drained, unimproved calcareous grasslands and limestone outcrops or pavement which support common rock-rose *Helianthemum nummularium*.

The species is single brooded, with adults typically flying from early June until mid-August, with a peak in numbers from late June to mid-July. The flight period varies considerably between years and between regions. The eggs are laid singly on the upper side of common rock-rose leaves. Females select plants that have fleshy leaves and are typically growing in sheltered situations. They lay in swards of varying heights from 1-30cm, but most frequently in medium (6-10cm) and taller (over 10cm) swards. The young larvae feed on the underside of leaves, leaving the upper surface intact. They hibernate at the base of the food plant or on the ground. The larvae start basking in early spring, before recommencing feeding. They possess ant-attracting organs on the abdomen and are sometimes attended by ants. The larvae pupate in late May, often lying on the ground on a silken mat, or attached by silk threads amongst the vegetation.

The butterfly has been lost from many sites over the last thirty years due to both intensification and under-management (Franco *et al* 2006). It forms discrete colonies on relatively small habitat patches, and because adults have a very limited colonising ability, extinctions are more common on small, isolated sites. This has resulted in increased fragmentation of the remaining sites, leading to further losses. Much of this change is masked in the 10km distribution maps due to an increase in survey intensity leading to the identification of previously unrecorded colonies.

Butterfly Conservation's presence records for northern brown argus over 2 timeslices, 1960-1990 and post 1990, are shown on the map below (10km grid scale).

Presence of northern brown argus records, 10km².
Source: Butterfly Conservation: Butterflies for the New Millennium.





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Confidence in climate change impacts³²

Distribution change:

HIGH CONFIDENCE

Mechanism:

LOW CONFIDENCE

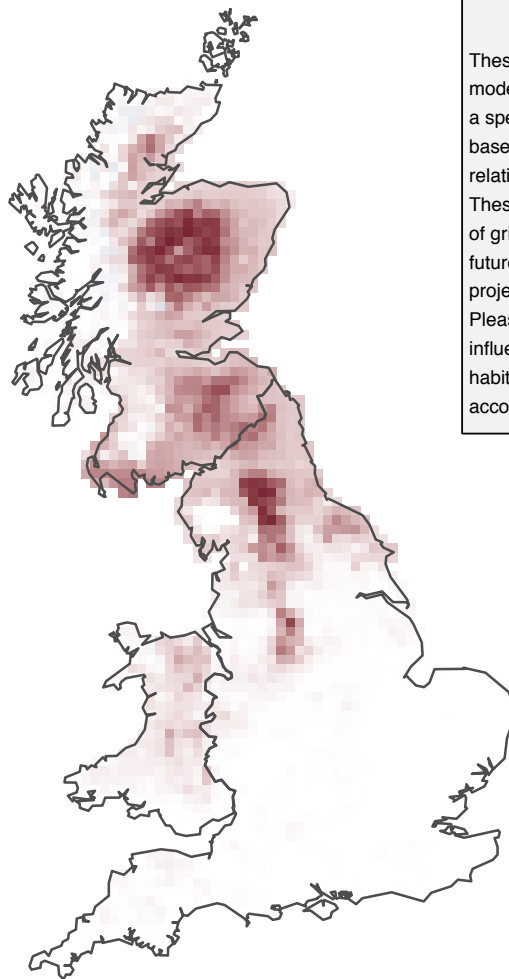
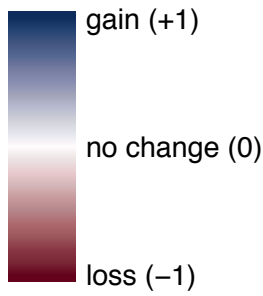
Changes in the distribution of the northern brown argus over the last thirty years are consistent with a warming climate (Franco *et al* 2006), although the precise mechanisms causing these changes are unclear. Nationwide field surveys suggest that 28% of historic English populations (with a pre-2000 record) are now extinct (Suggitt 2017, pers. com.). It appears to be particularly adversely impacted by warm winters (McDermott Long 2017). It is likely that the distribution of the butterfly will continue to contract significantly as the climate warms, with a decline in the suitability of many southern sites. Such a shift suggests that changes to the management of existing sites will be required to ensure or prolong their persistence. The poor natural dispersal ability of the butterfly is likely to prevent it colonising areas of the country that become more climatically suitable.

The butterfly is also threatened by the northward expansion of the brown argus *Aricia agestis* and the potential for hybridisation (Mallet, Wynne & Thomas 2010). The zone of potential hybridization now includes all extant English populations of northern brown argus, meaning that introgression³³ is a possibility at any English site. The consequences of this for the long-term persistence of the *artaxerxes* taxon are unclear at present, although given that the hybrids are known to be viable, extinction of the taxon in England should be considered possible. This should be monitored, as the adaptation options described below (the first three in particular) are better focussed on areas where *A. agestis* is not present and is not predicted to colonise (at least in the near future).

³² An assessment of the strength of evidence that distributions are changing and the mechanisms causing change are understood. Refer to Part B, section 5 of the species section introduction for more information.

³³ the transfer of genetic information from one species to another as a result of hybridization between them and repeated backcrossing

Projected change in potential distribution of northern brown argus in the UK with a temperature rise of 2°C (Pearce-Higgins *et al* 2015).



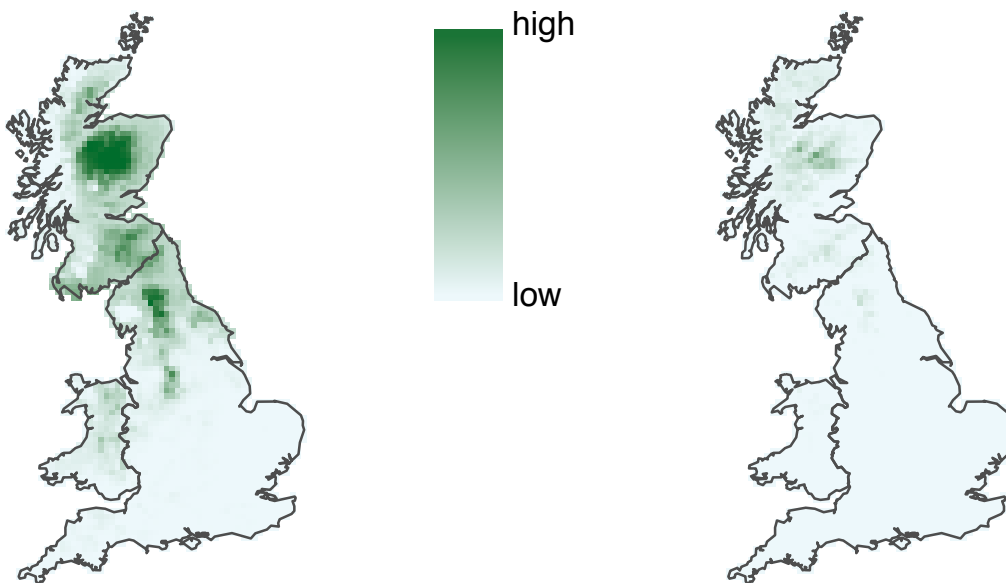
Climate suitability

These maps are created using statistical models which describe the probability that a species will be found in a 10 km grid square, based on its current distribution and its relationship to a number of climatic variables. These can be used to model the suitability of grid squares for a species under possible future climates when climate change projections are taken into account. Please note that other variables that influence species distributions, such as habitat and land-use change, are not accounted for in the modelling process.

Confidence of change

This species was not included as part of Natural England's Research Report NECR175 assessing the risks & opportunities for species in England as a result of climate change, so no assessment of confidence has been made for this species

Current climate scenario **Climate suitability** Low (2°C change) climate scenario



Further information on these projections can be found in the introduction to the species section (Part A, Section 3 and Part B Section 5). Note that this is a guide to where a species may be able to survive, it does not capture other issues such as habitat availability and fragmentation – see text above for further details. Contains public sector information licensed under the Open Government Licence v3.0. Please also see acknowledgement and copyright at the beginning of this manual.

Please read this case study alongside the relevant habitat sheets.

Adaptation options

The current range contraction, coupled with the butterfly's preference for laying its eggs in medium to tall swards, suggests that reductions in the availability of cooler microclimates may be a factor in its decline. Changes in management to provide a taller sward or suitable habitat on north facing slopes will help to ensure the availability of cooler oviposition sites and may offer a form of adaptation.

- Ensure optimum management of existing sites through grazing to provide a medium to tall sward that supports populations of common rock-rose and a wide range of nectar sources.
- In southern and lower altitude sites, manipulate management to promote areas with a cooler microclimate by creating taller swards and using scrub to produce shaded areas.
- Within existing sites, identify and protect areas that have the potential to act as climate change refugia, such as areas with topographic variation and north facing slopes. Take action to increase the area of suitable habitat around existing small populations by restoring or creating species rich calcareous grassland and managing scrub on existing grassland sites.
- Monitor known populations to determine the extent of any change and, where possible, seek to identify the mechanisms driving change. Measures should also be put in place to monitor the impact of any adaptation actions.
- Identify potential reintroduction sites in areas where the climate will remain suitable and that are outside the range of natural dispersal, and where *A. agestis* is not likely to colonise in the near/medium future.
- In the southern part of its range hybridisation with the brown argus *A. agestis* is likely to occur. Conservation objectives at the site level will need to reflect this, whilst objectives to maintain genetic diversity are considered at the national level.

Relevant Countryside Stewardship options

GS6 *Maintenance of species-rich grassland*

GS7 *Restoration towards species-rich grassland*

GS8 *Creation of species-rich grassland*

GS13 *Management of grassland for target features*

SP9 *Threatened species supplement*

Case Study

[Northern Brown Argus Project](#)

This project is led by Butterfly Conservation and seeks to improve the survival prospects of the northern brown argus in north-east England through a programme of vegetation management.

References and further reading

Butterfly Conservation [Northern Brown Argus](#) Information leaflet.

Ellis, S (2003) Habitat quality and management for the northern brown argus butterfly *Aricia artaxerxes* (Lepidoptera: Lycaenidae) in North East England Biological Conservation, Volume 113, Issue 2, Pages 285-294.

Franco AMA, Hill JK, Kitschke C, Collingham YC, Roy DB, Fox R, Huntley B and Thomas CD. (2006) Impacts of climate warming and habitat loss on extinctions at species' low-latitude range boundaries. *Glob. Chang. Biol.* 12, 1545–1553.

Mallet J., Wynne IR. & Thomas CD. (2010) [Hybridisation and climate change: brown argus butterflies in Britain \(*Polyommatus* subgenus *Aricia*\)](#). *Insect Conservation and Diversity* (2010) doi: 10.1111/j.1752-4598.2010.00122.x.

McDermott Long O. (2017). *An investigation into the vulnerability of UK butterflies to extreme climatic events associated with increasing climate change* (Doctoral dissertation, University of East Anglia).

Pearce-Higgins, J.W., Ausden, M.A., Beale, C.M., Oliver, T.H. & Crick, H.Q.P. (eds). 2015. [Research on the assessment of risks & opportunities for species in England as a result of climate change](#). Natural England Commissioned Reports, Number 175.

Ravenscroft NOM and Warren MS (1996) Species Action Plan Northern Brown Argus (*Aricia Artaxerxes*). Butterfly Conservation. Wareham.

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