



Twite
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Twite *Linaria flavirostris*

Climate Change Sensitivity: **HIGH**

Ability to Manage: **MEDIUM**

Non climatic threats: **HIGH**

Vulnerability: **HIGH**

Summary

Once widespread and locally numerous, the twite *Linaria flavirostris* has declined almost to extinction in England, though the precise cause of the current population decline is not well understood. The species is at the southern edge of its NW European range in the UK, and bioclimatic projections suggest that its current range in England will become unsuitable by 2080.

Promoting the resilience of existing sites is a priority for adaptation management in the UK. This includes ensuring the provision of tall heather and bracken for nesting close to the moorland edge, a wide range of seed food sources throughout spring and summer close to breeding sites, and, on their wintering grounds, saltmarsh with high densities of glasswort and other pioneer marsh species available from late autumn to early spring.

Description

The twite is a small songbird of the finch family. It is approximately 14 cm long and has a wingspan of 23 cm. They are mainly brown, with dark streaking on the head and back, a pale belly, a buff-coloured face and neck, and have a long forked tail. Males and females are similar except for the colour of their rump, which is pink on males and used in display, and brown on females.

Ecology and distribution

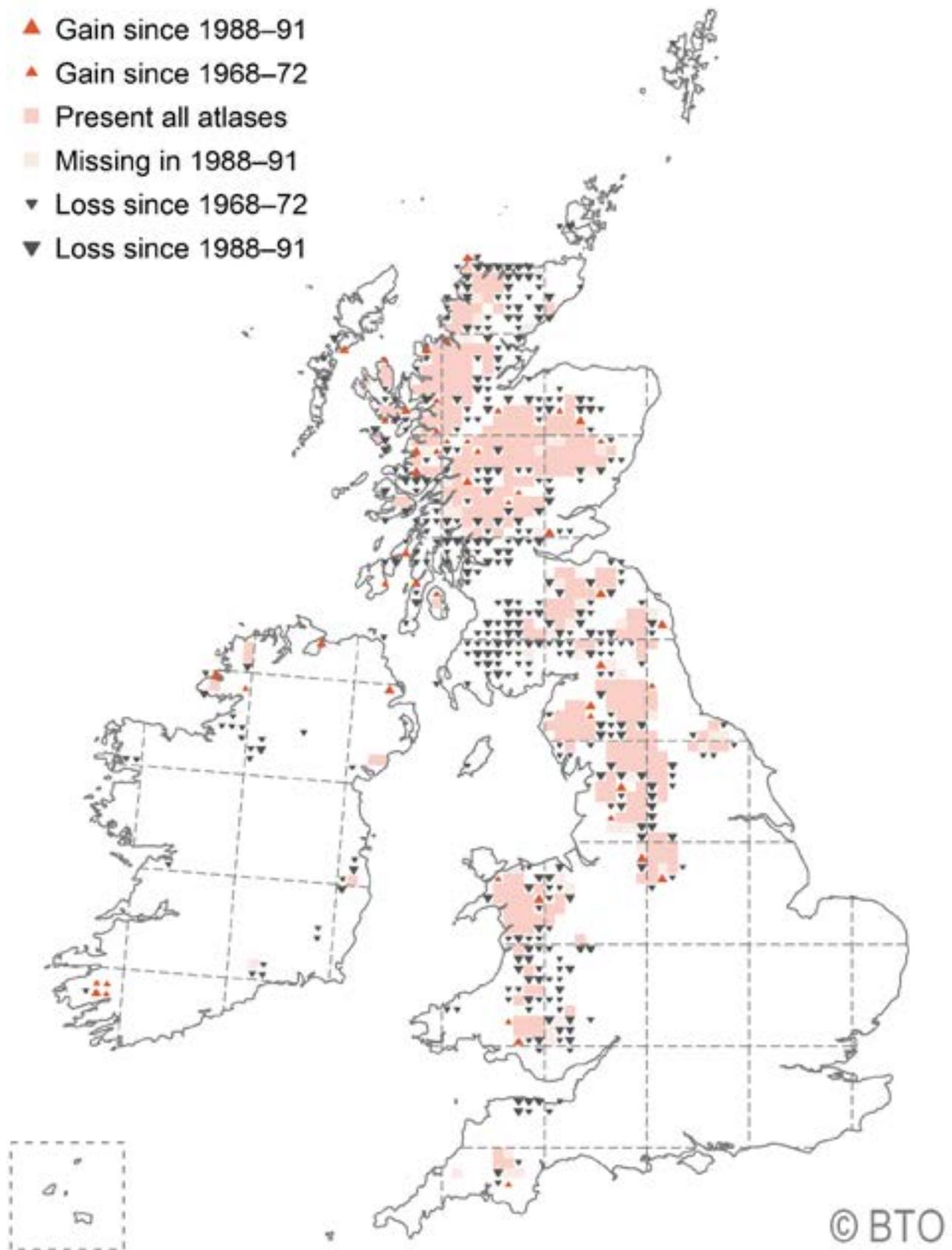
In the UK, most breeding twite occur in north-west Scotland, with small populations in upland areas of northern England and north Wales, and on the coast of Northern Ireland. In England, twite nest on open moorland and forage for seeds in flower-rich grasslands. They nest primarily in bracken *Pteridium aquilinum* and tall heather *Calluna vulgaris*, but will also use other dwarf shrubs and moorland grasses. Nests are placed on the ground, in vegetation, beneath boulders or on the ledges of cliffs and quarries (Orford 1973; Raine 2006). Birds commonly nest in loose groups, sometimes within a few metres, close to the moorland edge (Brown, Crick & Stillman 1995; Wilkinson & Wilson 2010). Twite feed mainly away from moorland, up to 3.5 km from nest sites (Raine 2006), and favour flower-rich meadows and pastures, roadside verges and other weedy areas. They feed on the seeds of a wide range of species, including annual meadow grass *Poa annua*, dandelion *Taraxacum officinale* agg., blinks *Montia fontana*, common sorrel *Rumex acetosa*, thistles *Cirsium* spp. and autumn hawkbit *Leontodon autumnalis*, with species being exploited as they become available (Raine 2006; Wilkinson & Wilson 2010).

Twite are multi-brooded, with up to three successful broods in a single season, although these may overlap (Wilkinson & Wilson 2010). Clutches of 1-7 eggs are laid from late April to late July, with a complete nest cycle taking approximately 30 days (Brown, Crick & Stillman 1995; Raine 2006; Wilkinson & Wilson 2010). Adults breed in their first year. After fledging, the young tend to remain on the moor for the first few days before moving to flower-rich areas in the surrounding farmland. Here, birds congregate into flocks where they tend to remain within a few kilometres of natal areas, although some individuals roam widely (Raine *et al* 2006b), before winter migration in October.

While some birds remain in the Pennines through the winter, most twite breeding in the South Pennines and Peak District migrate to saltmarshes on the east and south-east coast of England, from Yorkshire south to Kent (Brown & Atkinson 2002; Raine *et al* 2006a). In winter, they favour pioneer marsh communities where they feed on the seeds of glasswort *Salicornia* spp., annual seablite *Suaeda maritima*, sea lavender *Limonium vulgare* and sea aster *Aster tripolium* (Brown & Atkinson 1996). The distribution of birds on saltmarsh, particularly in late winter, is strongly related to the density of glasswort seed remaining on the plants (Atkinson 1998). The proximity of suitable roost sites may also be important in determining habitat selection. Birds return to breeding areas between March and April.

The twite population in England has declined markedly since the end of the 19th century, when their distribution included most counties in northern England (Holloway 1996). The species is now restricted chiefly to the South Pennines, although declines in abundance and range are continuing (Raine *et al* 2009; Balmer *et al* 2013, Wilkinson *et al* 2018). Recent analyses suggest that breeding productivity and survival is low relative to estimates for this population historically (productivity) and to other populations in the UK (productivity and survival; Wilkinson *et al* 2019). Furthermore, annual breeding productivity in the south Pennines is substantially lower for pairs nesting in bracken than in heather, suggesting that the use of bracken as a nesting habitat may represent an ecological trap for this population. However, the precise mechanism underlying this difference between nest habitat types is not known and requires further research. Past declines have most likely been caused by the loss and degradation of suitable habitat in both upland breeding areas (as a result of changes in land use and farming practices) and wintering grounds (most likely due to changes in estuary shape, dredging and increased storminess), but the relative importance of these factors and precise cause of the recent decline is not known (Atkinson 1998; Brown & Grice 2005; Raine 2006).

Historic changes in the distribution of the twite
(reproduced with permission of the BTO, from Balmer *et al* 2013)





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Confidence in climate change impacts³⁹

Distribution change:

HIGH CONFIDENCE

Mechanism:

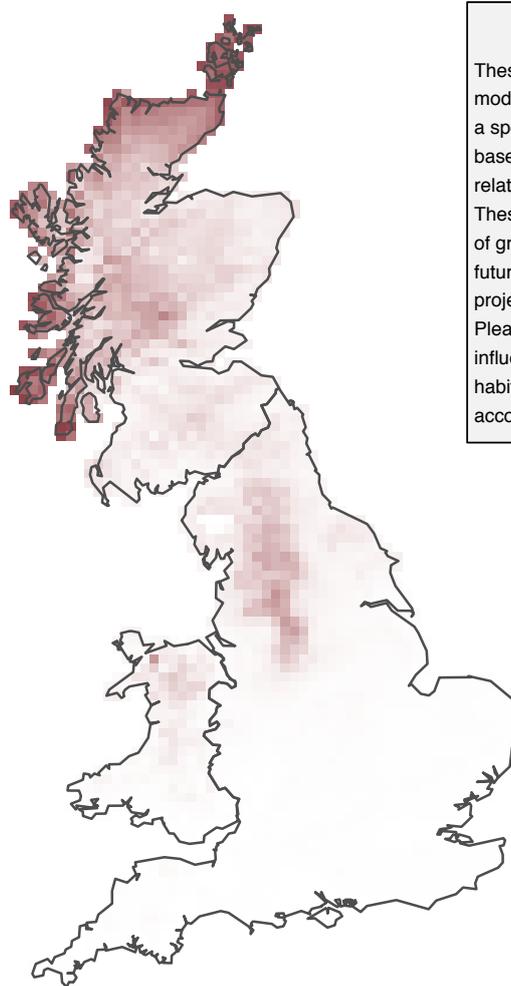
LOW CONFIDENCE

The current breeding range of twite in northern England and Wales is projected to become climatically unsuitable in the future, with suitable climate conditions limited to northern and parts of central Scotland by 2080 (Huntley *et al* 2007).

On their wintering grounds, rises in relative sea-levels combined with hard sea defences ('coastal squeeze') may cause further reductions in the area of saltmarsh, with the pioneer communities favoured by twite being the first to be affected (Brown & Grice 2005; Natural England & RSPB 2014; but see also Hughes & Paramour 2004).

³⁹ 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.

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



Climate suitability

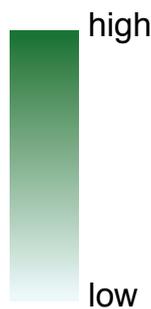
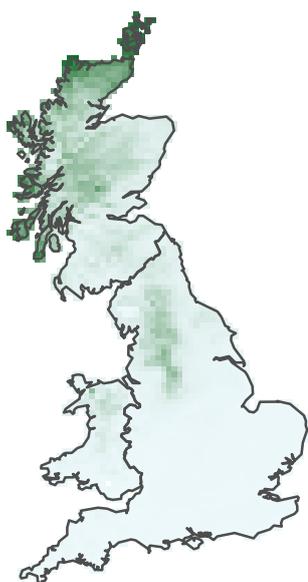
These maps are created using statistical models which describe the probability that a species will be found in a 10 km grid square, based on its current distribution and its relationship to a number of climatic variables. These can be used to model the suitability of grid squares for a species under 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

An assessment of the available data and other factors, as part of Natural England's Research Report NECR175, suggests that our confidence in this projection is very high. N.B. many confidence assessments are rated as low because there is a lack of published information on the likely influence of climate on the species concerned.

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

Climate change projections suggest that for populations in England and Wales, where there are no adjacent areas which are likely to have suitable climate conditions in future, adaptation should focus on maintaining existing habitat patches in an optimum condition to reduce the likelihood of other, non-climatic, factors exacerbating population declines. In particular, conservation efforts could identify those areas which might be least subject to climatic change (“refugia”) such as on the northern slopes of hills, and which could be important areas to help maintain populations in the future. However, to ensure the maintenance of twite in the UK it is important that adaptation efforts are also focused on the Scottish Highlands where there is overlap between current and future suitable climate conditions. Here, adaptation should focus on ensuring the quality of existing habitat before considering restoration of adjacent degraded areas. Research is necessary to identify the mechanisms of climate change impacts and ways of promoting resilience and recovery. Monitoring to evaluate the efficacy of conservation actions, particularly in southern parts of the range, will also help to inform adaptation measures.

Potential adaptation actions for the twite include:

- At sites supporting breeding twite, ensure optimum management of moorland through grazing to provide a mosaic of tall heather and mature bracken with a deep litter layer for nesting (although note that for bracken this should be reviewed dependent on further work to understand its potential role as an ecological trap). Protect nesting areas from burning with fire breaks, and from inappropriate grazing and afforestation.
- Identify those sites that might be least subject to climate change, as potential refugia where conservation action might be most sustainable.
- Within 1.6 km of twite nesting sites, and ideally as close as possible, ensure optimum management of meadows, pastures and other weedy areas through cutting, grazing and, where necessary, re-seeding to provide abundant seed food sources for foraging from spring arrival through to late summer.
- At existing sites supporting wintering twite, ensure optimum management of saltmarshes to provide high seed densities of glasswort and other important food-plants, particularly in sheltered areas that retain seeds in late winter.
- Monitor twite populations and the efficacy of conservation actions to assess the requirement for further adaptation measures.
- Undertake research to identify the causes of change, mechanisms of climate change impacts and factors that promote population resilience.

Relevant Countryside Stewardship options

CT3 Management of coastal saltmarsh

CT5 Creation of inter-tidal and saline habitat by non-intervention

CT7 Creation of inter-tidal and saline habitat on intensive grassland

GS6 Management of species-rich grassland

GS7 Restoration towards species-rich grassland

GS13 Management of grassland for target features

GS15 Haymaking supplement

UP3 Management of moorland

Case Studies

[Twite recovery project](#)

RSPB and Natural England have undertaken a trial programme of conservation measures in an attempt to arrest the decline of twite breeding in the south Pennines. Since 2009, management to increase the availability of seed food sources throughout the breeding season has been implemented via Higher Stewardship Scheme (HLS) agreement options on farmland close to breeding sites. The main conservation measures have involved the restoration of flower-rich meadows and pastures through re-seeding with twite food plants, and adjusting cutting dates and grazing regimes. The project has also sought to secure the appropriate management of moorland for nesting. Results from monitoring the twite population and habitat responses to conservation action during 2008-16 showed further declines in abundance and that some of the habitat interventions had yet to deliver the expected improvements, possibly due to their immaturity. Further work to improve the quality of these sites for foraging, including piloting some management trials, is ongoing. Recent population modelling suggests that conservation efforts should focus on interventions to increase first-year survival as well as breeding productivity.

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