Small red damselfly pair *Ceriagrion tenellum*

Small red damselfly
Ceriagrion tenellum (de Villers).

Climate Change Sensitivity:	HIGH	Ability to Manage:	MEDIUM
Non climatic threats:	HIGH	Vulnerability:	HIGH

Summary

The small red damselfly has a restricted distribution, and is found on heaths and wetlands in Southern and South West England. It has poor dispersal abilities and, unlike many other species at the northern edges of their range, the small red damselfly is projected to suffer rather than benefit from projected climate warming. This in part is due to its association with marsh St John's wort, which shares a similar distribution and is also considered to be vulnerable to climate change. Its high level of preference for watercourses associated with small bogs and slow flowing runnels makes it highly susceptible to changes in patterns of rainfall, abstraction or drainage.

Ensuring hydrological conditions are maintained in existing sites, and creating or restoring suitable habitat in locations close to these sites, are likely to be the most effective adaptation actions.

Description

The small red damselfly is one of our smallest damselflies and it is one of only two red damselfly species in the UK. The male has an all red abdomen. The females exist in several colour forms, with varying amounts of red and black on the abdomen. Both sexes have a bronze-black thorax and a red pterostigma[36].

Ecology and distribution

In England, this species is at the extreme north-western edge of its range. It has good populations in south west England and around the New Forest. Cornwall is a particular stronghold. Its preferred breeding habitat is narrow, shallow streams and runnels within wet heaths and valley mires where the pH varies between 5.5 and 8.5 (Askew 1988; Strange *et al* 2007).

It is found in small, sunny, unshaded, shallow waters with low flows, such as acid bogs or pools with lots of plant life (Strange *et al* 2007). The larvae need high water temperatures to develop, and are susceptible to competition from other species. It is a relatively weak flier, with most movement restricted to the centre of colonies (Parr & Parr 1979).

Eggs are laid in submerged and emergent plants and hatch after about a month. The larvae develop over two years. Emergence occurs over a relatively long period, which is typical of summer species of Odonata due to the over-wintering larvae being at different stages. The flight period runs from early June through to late August.

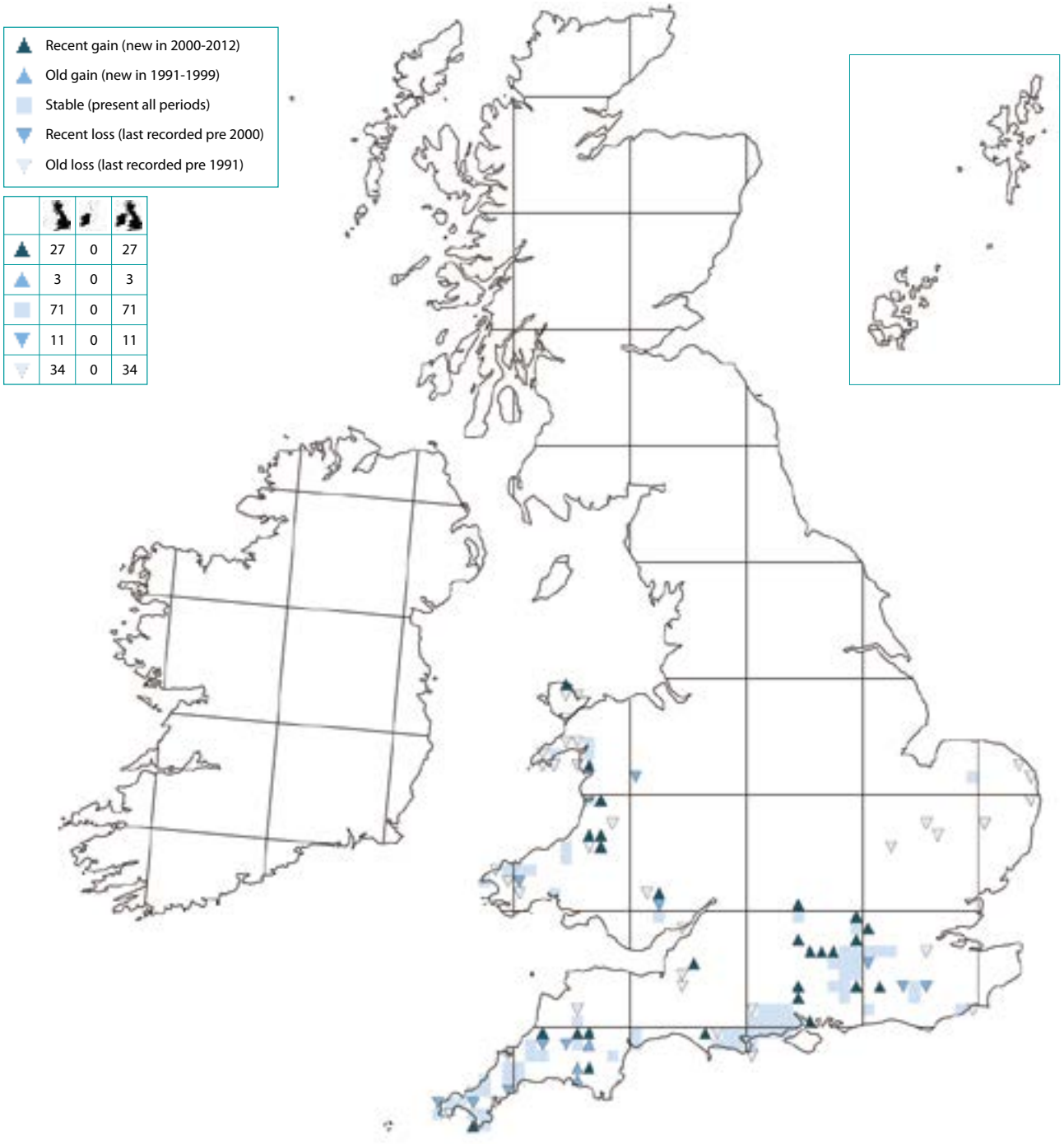
Although it is relatively widespread across areas where it is found, within this there are areas with no colonisation, suggesting a high level of specificity in its habitat requirements (Strange *et al* 2007; Hassall & Thompson 2010). Key factors associated with the selection of oviposition sites are thought to be the extreme selectivity of the flying population for boggy stream areas with little open water, and the presence of the water plant marsh St John's wort *Hypericum elodes*. It is probable that specific habitat requirements are the primary reason for the species' very limited distribution (Buchwald 1992).

It has suffered historic declines across its range as a result of wetland drainage and the fragmentation of heathland through agricultural improvement and afforestation (Brooks 2001).

The British Dragonfly Society records for small red damselfly are shown on the map below (10km grid scale).

36 A thickened or coloured cell in the outer wings of insects which stands out from other cells. They are particularly noticeable in dragonflies and damselflies.

Presence of small red damselfly records, 10km².



Recent gain (new in 2000-2012)	27	0	27
Old gain (new in 1991-1999)	3	0	3
Stable (present all periods)	71	0	71
Recent loss (last recorded pre 2000)	11	0	11
Old loss (last recorded pre 1991)	34	0	34

Confidence in climate change impacts[37]

Distribution change: **LOW CONFIDENCE** Mechanism: **LOW CONFIDENCE**

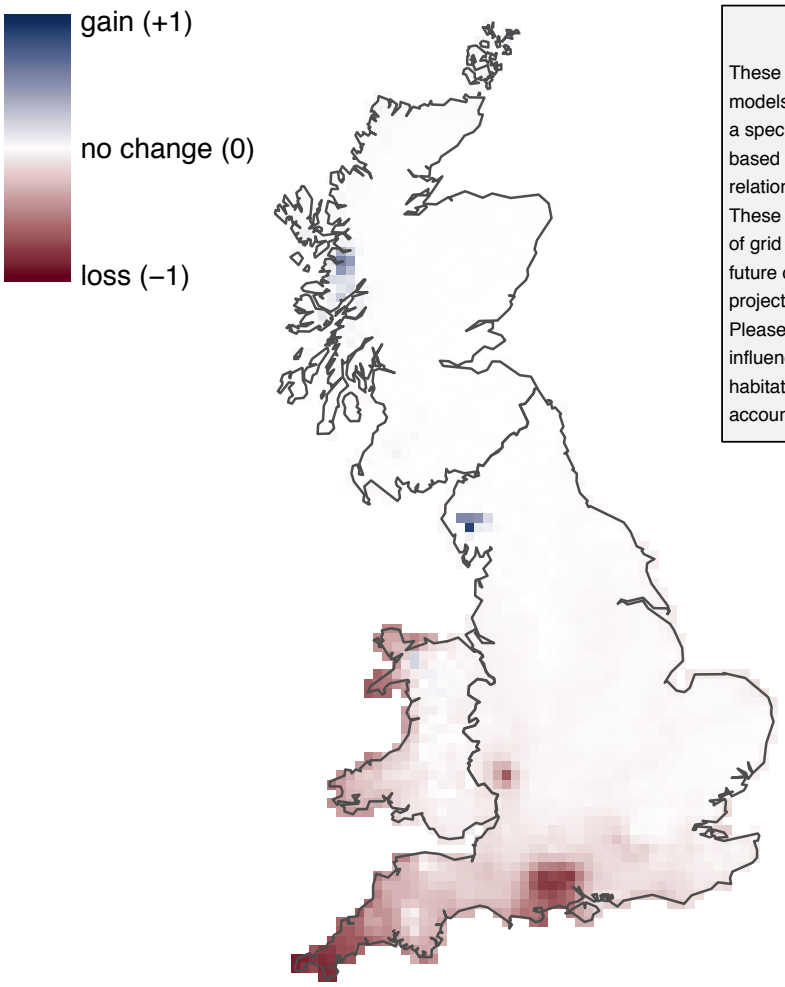
The small red damselfly is largely a Mediterranean species and is therefore well adapted to warm conditions. However, it has been shown to be highly sensitive to summer drought (Parr & Parr 1979; Chelmick 1980). In common with many other invertebrate species, the timing of its summer emergence is advancing in a manner consistent with warming (De Bruyn 2012), at a rate of over 2 days per year in Europe since 1990. Its specific habitat requirements have been identified as being the reason why its distribution is not responding positively to a warming climate (Hassall & Thompson 2010). The close association with marsh St John's wort increases the vulnerability of the damselfly as this plant is also considered to be vulnerable to climate change driven changes in rainfall (Carta 2014).

Because of its specific habitat requirements, projected changes in rainfall patterns present a clear threat to the species. An increase in the frequency of high intensity rainfall events is likely to lead to more flooding and erosion, and changes to the seasonal patterns of rainfall will lead to greater fluctuations in water levels and flow. Both will have an adverse impact on the quality of habitat in the water courses the species currently occupies.

The small red damselfly has been shown to be susceptible to competition from other colonising Odonata species (Walther, Burga & Edwards 2001), so any climate driven changes in the populations of other species could have a detrimental impact on the small red.

37 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 small red damselfly 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.

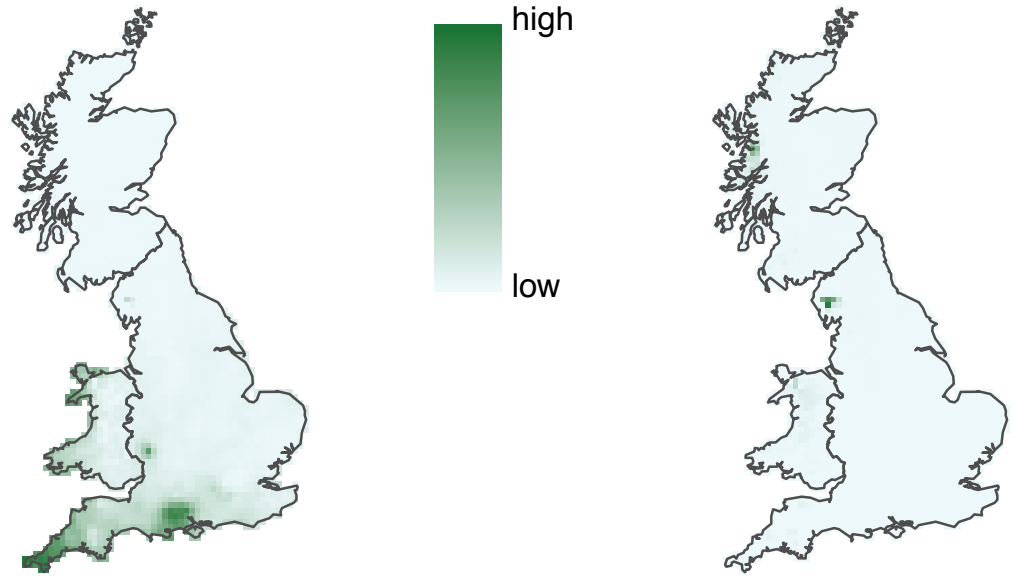
Confidence of change

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



Created by:	University of York	Created for:	Natural England	Created on:	August 18 2016

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

Understanding the specific habitat requirements of the small red damselfly is important for identifying site specific vulnerability to climate change and appropriate actions to mediate these impacts. Possible options include:

- Ensure optimum management of existing sites through the appropriate management of water levels and water quality to preserve hydrological conditions, and by controlling scrub to encourage vegetation, particularly marsh St John's wort.
- Maintain a range of suitable habitats by restoring or creating new sites between existing locations, to re-connect populations and encourage interactions between them.
- Artificial re-establishment on suitable sites distant from existing populations should be considered due to the relatively poor dispersal ability of adults and its specific habitat requirements, targeting places where suitable climatic conditions are most likely to persist.
- Establish monitoring programmes to determine population trends and the effectiveness of interventions.
- If it is suspected that climate change is responsible for losses, undertake research to identify the mechanisms driving these losses, including the impact of other species of Odonata on the viability of small red populations.

Relevant Countryside Stewardship options

WT10 Management of lowland raised bog

FM2 Major preparatory works for Priority Habitats (creation and restoration) and Priority Species.

Case Study

Eelmoor Marsh

Eelmoor Marsh, near Farnborough, Hampshire is a 79 ha fragment of the formerly extensive Cove Common, consisting of a complex of wet and dry heath, species rich grassland, mire, and woodland. The Common underwent rapid change throughout the 19th and 20th Centuries, with the cessation of traditional land use, the planting of a pine plantation, and extensive drainage. Since 1995, the land owners have sought to restore neglected habitats by introducing year round, low intensity grazing, removing invasive trees, and modifying the hydrology of the site. Diversification of aquatic habitats in particular has benefited dragonflies and damselflies, and the site is now an important place for the small red damselfly.

References and further reading

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