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Scotland: Significant species and species groups

Overall numbers

There is no accurate number of invertebrates found in Scotland and Scotland's seas. There are thought to be around 14,000 insect species known from Scotland, other invertebrates, including marine species, may add another 10,000, making a total of around 24,000 invertebrate species.

Endemic species

There are currently four species, termed endemic species, that are known from Scotland and no where else in the world. These are:

Ceratophyllus fionnus – a parasitic flea found in Manx shearwaters nests on the island of Rum only.

Cixius caledonicus – a cixiid bug which is thought to live under rocks in grassland, possibly with a preference for calcareous areas. There are three records for this species from the Lothians and Tayside, all of which were made prior to 1960. It is possible that this species is now extinct.

Protapion ryei – a weevil found on the Western and Northern Isles where it is associated with grassland, machair and brownfield sites with red clover (*Trifolium pratense*). This species is likely to be adversely affected by development of brownfield sites and grasslands being invaded by scrub.

Anaspis septentrionalis – a scaptid beetle known from specimens collected in 1976 near Aviemore. It is thought that this species may now be extinct.

In addition, the February red stonefly (*Brachyptera putata*) is now only found in larger rivers in the north of Scotland. Historically it was also found in the River Wye in Herefordshire however there have been no recent records from here. This species is affected by poor water quality, the acidification of head waters and river management schemes.

Species for which Scotland is a stronghold

In addition to these endemic species, Scotland also represents a stronghold for many species. In 1997 it was estimated that approximately 1300 Scottish insect species are, within the British Isles, restricted to Scotland. These species include the Northern emerald dragonfly (*Somatochlora arctica*), the mason bee *Osmia uncinata* and the Chequered skipper butterfly (*Carterocephalus palaemon*). Recent work has also indicated that Scotland is the European stronghold for the red pine hoverfly (*Callicera rufa*).

Keystone species

Some invertebrate species can be classed as keystone species whose loss from an ecosystem would have a major effect on other species populations and ecological processes in that system. These include the Wood ants (*Formica exsecta*, *Formica sanguinea*, *F. aquilonia* and *F. lugubris*) which influence the distribution, abundance and community structure of many other species of invertebrates as well as dispersing large numbers of plant seeds.

Invertebrates such as the brown shrimp (*Crangon crangon*) and Krill (*Meganyctiphanes norvegica*) 'power' marine ecosystems. They provide food for fish and marine mammals such as the Basking shark. Marine invertebrates are also responsible for some of the most important marine habitats. Flameshell reefs are created by the mollusc *Limaria hians*, and the west coast of Scotland is home to the majority of this habitat in the United Kingdom. These spectacular reefs can support over 250 species of plants and animals including sponges, worms, molluscs and crustaceans.

Special species

Marsh fritillary butterfly

The Marsh fritillary butterfly (*Eurodryas aurinia*) is declining in almost every European country and is now extinct in northern Belgium. The UK is believed to be one of the major European strongholds for the species, but even here its range has reduced by over 60%, and western Scotland now represents the most important area for this species. The Marsh fritillary was given full protection under the Wildlife and Countryside Act in 1998 and there are now five Special Areas of Conservation (SAC) which have the Marsh fritillary as a qualifying feature. Work is continuing to develop and implement suitable management regimes for these sites.



Pine hoverfly

The Pine hoverfly (*Blera fallax*), is an endangered hoverfly and confined to just two localities in Inverness-shire. It breeds in holes and roots of live and dead pine containing wet, decaying wood. Probably as a result of the way pine woods have been managed in the past, natural breeding sites are now very rare. The Pine hoverfly was included in SNH's Species Action Framework and the Malloch Society is managing a project to implement conservation measures to protect, maintain and expand existing populations.



To overcome the lack of breeding sites, artificial ones have been created by cutting holes in pine stumps and by sinking into the ground, plastic pots filled with pine wood chips and sawdust. These have been successful in attracting the Pine hoverfly to breed.

Work is now underway to find out how to make the artificial breeding sites work in the best way. Data on water levels and microbe populations in the breeding sites is being studied to work out the conditions required for optimising breeding success. It is hoped that the outcome of this work, together with the management of pine woods in a fashion that is sensitive to the requirements of the Pine Hoverfly will ensure the survival of this original pioneer of the Scottish landscape.

Pond mud snail

The Pond mud snail (*Omphiscola glabra*) is typically found in soft, nutrient poor waters with few other aquatic animals or plants. These include freshwater marshes, small ditches, temporary pools or seepages that dry up or significantly diminish in summer. These water-bodies are challenging habitats, which in the past were regarded as inferior wildlife habitats and were typically converted into productive agricultural land or improved visually for landscape reasons. Historically, this species was widespread throughout acidic lowland areas of England, Wales and Scotland, as far north as Perth. A recent survey has shown that this species has been lost from 64% of historical sites in Scotland.



Aspen hoverfly

Scotland holds the entire UK population of the Aspen hoverfly. It is known from only 14 sites in the Highlands, and is one of Britain's rarest hoverflies. Scotland holds the entire UK population of the Aspen hoverfly (*Hammerschmidtia ferruginea*) – one of Britain's rarest hoverflies. This UK BAP (Biodiversity Action Plan) priority species is known from just 14 sites in the Highlands, and is listed as endangered in the UK Insect Red Data Book.



Aspen hoverfly larvae are saproxylic – meaning they depend upon decaying wood. The larvae feed on micro-organisms in decaying sap under the bark of dead Aspen trees and branches. Dead Aspen can support breeding Aspen hoverflies for up to two years, but becomes unsuitable as the bark drops off and the wood dries out. When levels of deadwood are low sap runs on live trees can support a population, but only at low levels.

Stands of Aspen of at least 4.5ha will provide a constant supply of dead wood. Such stands are scarce, and threatened by developments such as roads, and underplanting with conifers. Larval habitat is also under threat, as deer and rabbits will strip bark from dead trees, while people remove dead trees and branches as firewood or simply to 'tidy' up.

The Malloch Society are testing management methods that may be employed to maintain the Aspen hoverfly. While some techniques are promising, none are as effective as maintaining this hoverfly's natural habitat. Recent research into the dispersal ability of the Aspen hoverfly shows that it can move up to 5kms from breeding sites and these data are being incorporated into conservation plans.

Freshwater pearl mussel

Over a half of the world's population of Freshwater pearl mussels (*Margaritifera margaritifera*) are found in Scottish rivers. These invertebrates, which live for up to 100 years, are at risk from a wide range of activities. Action to conserve the Scottish populations will make a major contribution to the global survival of this species.



Lichen running-spider

The Lichen-running spider lives on the bark of lichen covered trees in ancient broadleaf and native pine woodlands. It is threatened due to felling of native trees and pollution. The Caledonian pinewoods of the Scottish Highlands are the UK stronghold for this wonderful spider.

In Scotland the Lichen running-spider (*Philodromus margaritatus*) is generally found in the Caledonian pinewoods of the Highlands, which is the UK stronghold for this species. There is another, distant, UK population in the broadleaf woodlands of Southern England. Due to felling of native trees and pollution, this wonderful spider was listed as Nationally Scarce in the UK Red Data Book and is a UK Biodiversity Action Plan priority species.



The Lichen running-spider belongs to a group known as 'running crab spiders' (Philodromidae), named for their flattened bodies, outstretched legs and ability to walk sideways and backwards. Unlike many spiders, running crab spiders do not spin a web to catch prey. Instead, they usually lie in wait, perfectly camouflaged, and use their powerful legs to overpower their quarry.

The sure-footed Lichen-running spider is able to run over trees with exceptional agility thanks to special brushes of hairs on their feet, called 'scopulae'. The scopulae provide phenomenal grip, by adhering to the extremely thin film of water that coats most surfaces. The scapulae also help the spider to hold its prey. It is also a master of camouflage, thanks to its markings and ability to change colour to some extent, allowing it to blend seamlessly into the background on a lichen-covered tree. Imagine you are looking at the trunk of a pine tree, when a piece of grey-green lichen gets up and runs away, revealing itself as the Lichen running-spider!

Development and woodland felling continue to threaten this formidable and very special predator of the Caledonian Forest. In order to conserve spiders, such as the Lichen-running spider, it is essential that we have an understanding of their distribution and ecological requirements. The British Arachnological Society and the Biological Records Centre are working to improve our knowledge through Phase Two of the Spider Recording Scheme (SRS). The information provided by this and detailed research will help inform conservation action.

Narrow-headed ant

The Narrow-headed ant (*Formica exsecta*) is a rare wood ant entirely restricted to the Scottish Highlands and one remaining site in England. It is an important indicator of a healthy woodland ecosystem as it is associated with natural and man-made open glades and edges. It is also an important 'functional species', providing essential ecosystem services such as distributing the seeds of many plants and preying on range of invertebrates which feed on plants, such as aphids and caterpillars.

This ant has always had a highly disjunct distribution, but used to be more widespread in southern counties of England. The core population is now found in the ancient Caledonian Pine Forests of Speyside, with small outlying colonies in Deeside and Perthshire. It continues to hang on at its one remaining English site, a heathland SSSI in Devon, but it is feared this wonderful animal may soon become extinct in England.



The decline is thought to be the result of a combination of factors, including the dramatic loss of lowland heathland in England, disturbance through human activities (such as dirt-biking and pony grazing), and commercial forestry which destroys the natural habitat structure and is far too dense (and therefore dark) for the ants which depend on warm sunshine to raise the temperature of their brood. Fragmentation of woodland habitats in Scotland is also a serious concern as Narrow-headed ants are unable to cross areas of unsuitable habitat, and so can rarely colonise new habitat. This may result in inbreeding, as all of the colonies in one area are closely related and no queens are arriving from more distantly related populations. It also means that there are suitable areas that are unoccupied by the ants simply because they cannot cross the hostile habitat to get there!

The Narrow-headed ant is listed as endangered in the UK Red Data Book, and is both a UK BAP Priority Species and also listed on the Scottish Biodiversity List. Two important areas are receiving protection and conservation management – one as a Site of Special Scientific Interest (SSSI) and RSPB reserve, and the other a Forestry Commission Scotland forest where foresters are proactively helping to protect and enhance populations of the ant. The Scottish Wildlife Trust has also campaigned successfully for the better protection of this ant over the last decade and continues to provide management advice to those landowners with ants on their land. More information on the ecology of the species is available in a Scottish Natural Heritage commissioned report, and research is ongoing. It is hoped that conservation action, directed by improved understanding, will help ensure the Narrow-headed ant's survival.

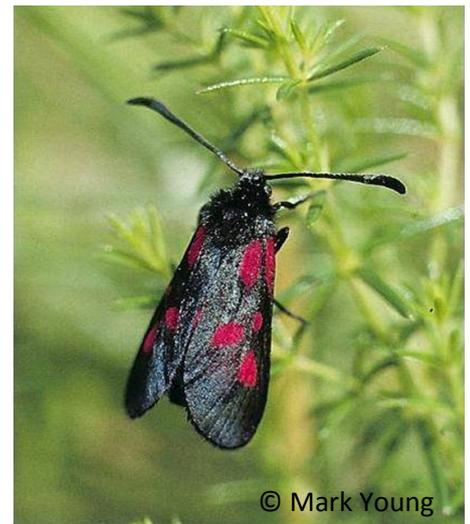
New Forest burnet moth

Despite its name, the New Forest burnet (*Zygaena viciae*) is now only found at a single site in the UK, in Argyll and Bute. Interestingly, the population of the moth in Argyll is a sub-species (*Zygaena viciae argyllensis*) which is only found in this part of the world. It is fully protected under Schedule 5 of the Wildlife and Countryside Act, and is included on both the UK BAP priority list and Scottish Biodiversity List. Unfortunately, this endangered moth is still threatened by illegal collecting as well as habitat degradation.

The New Forest burnet was first discovered in the New Forest in 1869, but was extinct by 1927. It was rediscovered the species in Western Scotland in 1963 at a coastal site in Argyll and Bute and efforts to find other isolated populations continue along the coastline of Western Scotland, but none have been found to date. In 1980 the site had become heavily grazed, eliminating the larval foodplants, and it was feared that this last population had become extinct. Thankfully, an intensive search conducted by the Burnet Study Group (BSG) found 12 individuals on an ungrazed ledge.

Work, completed in partnership with the landowner, BSG and Scottish Natural Heritage, has seen grazing reduced through erection of a fence and careful management. Since conservation efforts began in 1990, the population has made a dramatic recovery. The Species Action Plan aimed to increase the population to 250 individuals by 2010 – this goal was achieved in 1999, over ten years early!

However, this moth is still under threat – particularly as there is only a single surviving population, and a chance event could cause the UK extinction of this species, and the global extinction of the subspecies.



Northern February red stonefly

The Northern February red stonefly (*Brachyptera putata*) is a UK Biodiversity Action Plan priority species and included on the Scottish Biodiversity List. This stonefly tends to be found in the upper reaches of larger rivers crossing open heath and upland pastures. It requires unpolluted, highly oxygenated waters with good exposure to winter sunlight, which is important both for adult emergence and to support the algae on which the larvae feed.



The Highlands have always been the stronghold for this rare species, but it used to be present in the Rivers Usk (Wales) and Wye (England). Surveys undertaken by Action for Invertebrates and the Countryside Council for Wales (CCW) since 2001 have failed to detect any Northern February red stoneflies in England or Wales. However, they were found in many rivers in Scotland where they had not been previously recorded.

This species is threatened by sheep and cattle farming, which can cause insecticide pollution, eutrophication (where increased nutrients result in plant blooms, reducing oxygen levels) and disturbance by livestock crossing rivers. Afforestation also poses a threat, as it can block the essential winter sun.

Fortunately, many of the existing populations occur in upland rivers which are managed for spawning salmon, which have similar habitat requirements. The Riverfly Partnership are also carrying out surveys and research to provide a better understanding of the lifecycle to inform conservation efforts. Continued promotion of appropriate management of river catchments in Scotland is required to protect the remaining population, while it is hoped that future surveys will rediscover this wonderful riverfly in England and Wales.



Further information can be found in the species and habitat management sheets and species dossiers available in the 'Publications' section of the Buglife website.