WOODLAND TRUST

Wood Wise

Summer 2012

Scottish Wildcat

Neville Buck

Woodland Conservation News

Woodland management for protected species

Protected species – introduction

Gorse Covert Mounds WTPL-WT STaff

Protected species legislation can seem like a real headache for busy site managers, but it plays a crucial role in ensuring the conservation of some of our most vulnerable species. Global biodiversity is suffering from human-induced development, industrialisation and the over exploitation of natural resources. Extinction rates are alarmingly high; numerous species have already succumbed. But in many countries there are policies and efforts in place to help support and benefit some of our most vulnerable wildlife.

Several threatened UK species are legally protected, either at national level under Schedule 5 of the Wildlife and Countryside Act 1981 (WCA), or European level under Schedule 2 of the Conservation of Habitats and Species Regulations 2010. Woodland species protected nationally include stag beetles and red squirrels, whereas European Protected Species (EPS) native to the UK include all bats, great crested newts and Scottish wildcats.

Under the WCA it is an offence (subject to exceptions) to intentionally kill, injure or take any wild animal listed on Schedule 5; in Scotland it is an offence to intentionally or recklessly kill, etc. It also prohibits interference with places used for shelter or protection, and the intentional disturbance of animals occupying such places. The WCA also prohibits certain methods of killing, injuring, or taking wild animals[i].

For EPS it is an offence to:

- Deliberately capture or kill a wild animal of an EPS.
- Deliberately disturb any such animal, including disturbance likely to impair their ability to survive, breed or reproduce; hibernate or migrate (if relevant to the species). The same applies if the animal is rearing or otherwise caring for its young.
- Deliberately take or destroy the eggs of such an animal.
- Damage or destroy a breeding site or resting place of such an animal.
- Keep, transport, sell or exchange, or offer for sale or exchange, any live or dead wild animal of an EPS, or any part of, or anything derived from, such an animal.

These apply to all stages of the life of the animals involved[ii] .

Natural England offer EPS best practice guidance to avoid committing an offence under the regulations[iii]. Woodland managers are advised to obtain information and best practice guidance from the Forestry Commission[iv]. If this best practice guidance cannot be followed or if it is not applicable, then a licence must be sought for any work that could commit an EPS offence. These must be obtained from Natural England[v], the Countryside Council for Wales, Scottish Natural Heritage or the Environment and Heritage Service, Northern Ireland.

However, if good practice management is followed there is no need to apply for a licence. Work planned well in advance can often work around the EPS' life cycle, ensuring no disturbance or destruction is caused. There are many examples of this on Woodland Trust land, such as the work carried out in Bovey Valley Woods (see case study page 3).

The following case studies highlight legislation and best practice for a number of protected UK woodland species.

[i] JNCC (2012). *Wildlife and Countryside Act 1981, chapter 69*. Available online: http://jncc.defra.gov.uk/PDF/waca1981_schedule5.pdf

[ii] UK Legislation (2012). *The Conservation of Habitats and Species Regulations 2010, schedule 2*. Available online:

http://www.legislation.gov.uk/uksi/2010/490/schedule/2/made

[iii] Natural England (2012). *EPS best practice guidance*. Available online: http://www.naturalengland.org.uk/ourwork/regulation/wildlife/species/epsbestpractice.aspx

[iv] Forestry Commission (2012). *European Protected Species*. Available online: http://www.forestry.gov.uk/eps

[v] Natural England (2012). EPS Licensing. Available online: http://www.naturalengland.org.uk/ourwork/regulation/wildlife/species/epslicensing.aspx#1

Bovey's barbastelle bats

The barbastelle bat, *Barbastella barbastellus*, is regarded as one of the rarest species of bat in Europe. Over the past century their populations have undergone severe declines. The British population, estimated in 1995 to be a total of 5,000 individuals, is sparsely spread across southern England and Wales. Their global IUCN status (2001) is Vulnerable. In the UK they have their own Biodiversity Action Plan, are protected under Schedule 5 of the Wildlife and Countryside Act (1981) as amended and by the Conservation (Natural Habitats &c.) Regulations (1994), and they are a European Protected Species (EPS).

The habitat preference of the barbastelle is wooded river valleys, but they will occasionally use meadows and areas of human occupation. They mainly roost in trees; under loose tree bark or in small cracks in summer, and in large hollow trees during the winter months. These niches are mainly found in ancient complex woodland, but this is becoming an increasingly rare resource as development and clearance continue to destroy our priceless natural heritage.

Intense woodland management can also have a detrimental effect, especially if trees suitable for roosting are removed, or if the wood itself is opened up too much. Barbastelles forage in dark

Barbastelle bats Richard Knott

understorey in the early evening, until light levels drop enough for them to fly out into the open without risking predation. This can give them up to two hours extra foraging time per night. Reduction in prey, due to pesticide use, and habitat simplification by fertilisers and overgrazing, is also thought to have contributed to their decline.

The Bovey Valley Woods complex is a 86.33 hectare mixture of ancient semi-natural woodland (ASNW), plantations on ancient woodland sites (PAWS), riverine habitats and old meadows. They sit in the valley of the River Bovey, along the south-east edge of Dartmoor National Park.

Through their Biodiversity Action Plan, Dartmoor National Park established a woodland bats working group, to ascertain the importance of woods to bats. They believe many bats made greater use of the woodland areas than the surrounding open moor. Surveys were conducted and bats, including barbastelles were found in several local woods, including the Bovey Valley.

PAWS restoration work started in Bovey Valley Woods and a harvesting map was created. Halo thinning was carried out around remnant broadleaf trees; gradually creating space and increasing light levels around the trees to ensure their survival.

In 2006, a survey by Frank Greenway failed to record the Bechstein's bats he sought, but it did catch a number of barbastelle bats. In 2007/8 a barbastelles in the landscape project was funded by SITA and the study was carried out by then PhD student Matt Zeale[i].

In woodland, the bats were caught along tracks and rides using mist nets and harp traps. Those in known tree roosts were captured with hand nets. The nets and traps were set up before the bats emerged in the evening to forage and remained there for six hours, or until all the bats had left the tree roosts. Trapping sites were selected by assessing the habitat structure of the woodland and using previous survey data.

After capture and condition assessment, the caught female barbastelles were fitted with light radio-transmitter tags (Pip3, 0.35g). These weigh on average 4.4 per cent of an individual's total body mass. A small section of fur was clipped and the tag attached on the dorsal side between the scapulae using Skin Bond (biodegradable glue); these have a life expectancy of two weeks. Pregnant females and juveniles were excluded from this, so as not to cause them difficulties. All tagged bats were also fitted with rings to enable future identification.

Continuous tracking was used to monitor and locate the bats following release, for an average of

Split fissure roost James Mason

Matt Zeale tracking bats Richard Knott

2.53 nights per bat. The tracking signal was followed, by foot and car, and an approximation of the bats flight path was recorded. The signal type showed whether the bat was stationary or foraging.

The tracking information and habitat data, taken from aerial photographs, showed barbastelle bats have a clear and significant preference for foraging in riparian vegetation, followed by broadleaf woodland and then unimproved grassland. Open water was the least selected habitat – suggesting the importance of this has previously been over-estimated – but these areas do support riparian vegetation.

However, bats may only favour riparian areas for foraging because a large percentage of the remaining undisturbed ancient woodland is located in hard to manage locations, such as steep valley sides. These are difficult to farm or clear. The areas have become self-thinning and therefore contain a good quantity of dead and dying wood, which make good roosting opportunities.

The study showed barbastelle bats have a strong preference for roosting under flaky bark, in cavities and cracks, and most frequently in broadleaf trees. Roost trees were most often found in ancient, unmanaged woodland, and in oaks, *Quercus* sp. Roost trees were also found to be taller than other trees, and old or dead.

The foraging distances for individuals was varied. But two of the tracked bats demonstrated very large ranging behaviour (bat 190: 17.03 km, bat 260: 20.38 km). This may, in part, be due to the availability of productive foraging habitat and competition between individuals. This is a landscape scale species, roosting in woodland but ranging widely. They are a good indicator of a healthy landscape and their overall decline suggests the need for more woods and trees.

The real question is, did PAWS restoration save the roosts in the trees or did it improve conditions for them during haloing operations? Hopes are that another study will shed some light on this question. A Woodland Trust guide, *The conservation and restoration of plantations on ancient woodland sites: A guide for woodland owners and managers,* offers further information.

While there is a general call for increased management of our woods, and this will benefit some species, consideration must also be taken for those species that require more undisturbed habitat and old trees. Due to the good management

practices followed by this project there was no need to apply for an EPS licence.

[i] Zeale, M (2009) Barbastelles in the Landscape: Ecological Research and Conservation in Dartmoor National Park, A Report to the Dartmoor National Park Authority and Sita Trust.

Stourhead's dormice conservation

The hazel dormouse, *Muscardinus avellanarius,* is classed as vulnerable in the UK and protected by UK law under the Wildlife and Countryside Act 1981, has its own UK Biodiversity Action Plan and is a European Protected Species. It is in decline in the north of its range, such as the UK and Sweden, due to habitat loss and fragmentation. However, it is a fairly widespread and common species in other parts of its range, so classes as Least Concern on the IUCN Red List of Threatened Species.

Hazel dormice are rather attractive mammals, with honey coloured fur on their backs and paler, cream underbellies; large, black eyes; and long, fluffy tails. They eat flowers, pollen, fruit, nuts and insects. The females will eat more when they are with young. Dormice are mainly arboreal, spending the majority of their time in hedgerows and tree canopies, which gives them protection from ground-hunting predators.

As a nocturnal species, they spend the day in nests they build from leaves, moss and grass, in tree cavities or shrubs. This makes them difficult to survey as they are rarely seen. Between October and April dormice hibernate in nests on or under the ground. They also have the ability to enter a state of torpor when the weather in summer is bad or food becomes scarce. This helps to preserve the fat reserves they have built up.

They live in deciduous woodland, coppice and thick shrubbery, but can also be found in conifer plantations on previous ancient woodland sites. Dormice generally favour a vigorous, unshaded shrub layer with plenty of intertwining branches to allow them to move freely through the wood. A canopy of mature trees is needed, but not too dense as they will outshade the shrub layer. Overgrown hedges also make great dormice habitat. Because of this they are vulnerable to woodland and hedgerow management.

Their distributional range and population is estimated to have declined by half over the last 100 years. In the UK they are mostly found in the southern counties of England and Wales, but they were once widespread.

The National Trust's Stourhead Estate, situated at the meeting point of Dorset, Somerset and Wiltshire, covers a 1,072 hectare (ha) area. This includes around 121 ha of woodland; 60 per cent is native broadleaf, with 40 per cent commercially managed and dominated by conifer (mainly Douglas fir, *Pseudotsuga menziesii*, sitka spruce, *Picea sitchensis*, and larch, *Larix decidua*). But many of the woodland compartments now comprise a mix of deciduous and coniferous trees, moving away from monoculture systems and increasing nature conservation value.

Dormouse in nest box Tamsin Holmes

Dormouse in nest box Tamsin Holmes

Countryside Ranger Tamsin Holmes helped secure funding to carry out a dormouse survey of the estate, targeting woodland with suitable habitat. Armed with a troop of willing volunteers, 162 nest boxes were built and in November 2008 were positioned in seven chosen locations throughout the woodland. The box checks began in May 2009. Many were difficult to locate because the undergrowth had grown significantly during the intervening months, but careful mapping meant all were found.

The boxes were checked on a monthly basis between May and November 2009. The first round of checks found four dormice. More dormice were recorded during subsequent checks. In fact 17 of the nest boxes were used by dormice in five of the seven locations originally identified.

There are two main ways to encourage dormice in woodland: improving food sources and habitat structure. It is vital to have good diversity in the woodland and hedgerows. Dormice require food from April/May right through to October/November. Importantly they need to build sufficient fat reserves to survive winter hibernation.

Bramble, *Rubus fruticosa*, is a good food source as it has long flowering/fruiting seasons, and dormice eat both. Honeysuckle, *Lonicera Periclymenum*, is also beneficial as it often flowers when there is little else around, and hazelnuts provide important fats for winter. Oak trees, *Quercus* sp., offer acorns, flowers and a variety of insects such as aphids and caterpillars. Hornbeam, *Carpinus betulus*, seeds and blackthorn fruit can also be good food sources, especially where hazel, *Corylus avellana*, is scarce.

At Stourhead some of the larger, but not ancient or veteran, beech trees have been felled to give the understorey more light and encourage bramble and natural regeneration. Fifty hazel trees have been planted in wiggly lines to improve food source and

connectivity through the wood. Management of the woodland by the National Trust aims to encourage dormice and increase their numbers across the estate; this benefits many other species too.

Dormice favour woodland edges, so ride and glade maintenance is important. So too are managing non-native plants, creating log piles, retaining ancient and veteran trees, creating a variable age structure and managing standard trees. All woodland work is planned to fit with the dormouse's yearly cycle, to prevent disturbance. For example, any felling is carried out between November and March when dormice are in hibernation.

Monitoring can be difficult as dormice appear to favour natural nesting sites to man-made boxes. So in areas with ample supply of natural niches, dormice are unlikely to be found in boxes. The dormouse population will continue to be surveyed to assess the success of management. Stourhead is now registered with the People's Trust for Endangered Species as a dormouse monitoring site. This feeds into the National Dormouse Monitoring Programme.

Woodland management for newts

The great crested newt, *Triturus cristatus*, is Britain's largest newt and can grow up to 17cm (the females tend to be longer than the males). It is also Britain's most threatened newt. In Europe they are listed in Appendix II of the Bern Convention, Annexes II and IV of the EC Habitats Directive, and are a European Protected Species (EPS). In the UK they are listed in the Wildlife and Countryside Act 1981 and Schedule

Great crested newt northeastwildlife.co.uk

2 of the Conservation Regulations 1994, and have their own Biodiversity Action Plan. This means it is protected at all stages of life, even as an egg.

Great crested newts are also known as warty newts because of their black/brown warty skin. They have bright orange undersides with irregular black blotchy markings. During the breeding season the males develop an impressive jagged crest along their backs, and a silver streak along their tails. At all other times of year the males and females look very similar, but females always have a visible orange line on their tails. They feed on a variety of invertebrates, such as insects and worms, while their tadpoles eat aquatic insect larvae and water fleas.

Great crested newts favour medium-large, shallow ponds (they only need to be 50cm deep) with submerged vegetation and a neutral pH (although this is hard to control). The newts use plants to hide in and protect their eggs by folding them up in the leaves of plants or pond detritus. Great crested newt breeding season is around April-May. They will leave their ponds in August and September, and hibernate between October and February in dense undergrowth, beneath timber, log piles, turf and rocks, among tree roots or underground in mammal burrows.

One of the main threats to the survival of the great crested newt in the UK is the widespread loss of breeding ponds. There are several reasons for this: intensification of agriculture, water table reduction, infilling for development, neglect, fish stocking, and waste disposal. But they also use terrestrial habitats, and the degradation, loss and fragmentation of these habitats is having massive negatives consequences on the species. Pollution and the toxic effects of agrochemicals that leach into ponds have also been linked to great crested newt decline.

Great crested newt WTPL

Pond Conservation has produced guidance on creating new wildlife ponds in woodland. Woods are particularly good places to locate ponds because their waters are often clean, certainly compared with many other terrestrial habitats. Trees filter out pollutants and buffer ponds and other water bodies within them from contaminated water, such as the run-off from farms. Ponds containing great crested newts should not be de-silted unless absolutely necessary, for example for health and safety reasons.

Woodland ponds are not only important for newts; at least 30 BAP pond species, as well as Red Data Book and Nationally Scarce species, inhabit woodland ponds. They also provide important drinking water for birds and bats. They support a wide variety of invertebrates, such as dragonflies, which in turn feed other woodland species. A number of scarce plants can also be found in woodland ponds.

Both ponds and terrestrial habitats are used for foraging. The diverse understorey found in much deciduous/mixed woodland provides great opportunities for foraging, but the usually poor understorey of coniferous woods is less suitable for great crested newts. The needles of conifer trees can also acidify water. Populations of great crested newts have a greater chance of survival and opportunities for growth if they inhabit areas with landscape-scale clusters of ponds connected by suitable terrestrial habitat.

This newt species can travel up to 0.5km from ponds, so it is important to consider both the aquatic and terrestrial habitat. Creating log/brush piles around the ponds provides places for newts to secrete themselves and hibernate. Management around ponds must be carefully planned to minimise the risk of disturbance and other negative impacts. For example, there should be a presumption against amenity style mowing within 500m of the pond. When managing land where great crested newts are in the vicinity you should take a precautionary approach and consult with the appropriate EPS licensing authority. Failure to do so could result in a fine.

The Woodland Trust has a number of high-quality great crested newt sites. At Dutton Park, Cheshire, seasonal pools have been created by making scrapes in the ground. These provide the shallow conditions great crested newts favour, have no fish to predate upon the eggs/tadpoles, and contain vegetation for folding around newt eggs. They also provide connectivity with other ponds in the area.

Great crested newt colonies are known to be within 500m of the Trust's new flagship Diamond Wood in Leicestershire, once the site of an old open cast mine. A lake was created here prior to the Trust obtaining it. It has graded shallow edges but currently no vegetation, but with maturity it may provide good newt habitat. In future, additional wetland work such as providing scrapes and ditches adjacent to the lake will provide further habitat and connectivity.

Gorse Covert Mounds is an urban fringe wood around Warrington. It is located alongside Risley Moss Local Nature Reserve. Both sites are good for great crested newts. Although an urban site, Gorse Covert Mounds is managed sensitively and at low intensity. This shows habitat and ability to range are important factors for great crested newt conservation.

The relevant EPS licensing authority should be informed of any work in or around great crested newt habitat, and a licence applied for if appropriate.

Red squirrel northeastwildlife.co.uk

Red squirrels on Anglesey

Arboreal red squirrels, *Sciurus vulgaris*, are protected in Europe under Appendix III of the Berne Convention, and in the UK under Schedules 5 and 6 of the Wildlife and Countryside Act 1981. They can be found in broadleaved and coniferous woodland, and have a varied diet including seeds, buds, flowers, fruit, insects, fungi and sometimes birds' eggs. They live in dreys, nests high in trees built of moss and sticks, and seldom come down to the woodland floor.

The North American grey squirrel, *Sciurus carolinensis*, was introduced to England at Henbury Park, Cheshire, in 1876, at Castle Forbes, County Longford in Ireland, in 1911, and in other areas of the UK in the 1920s. This has led to regional extinctions of the native red squirrel. This occurs as a result of competition for resources and through the spread of pathogenic disease from grey to red squirrels; most notably squirrel pox virus. However, in one corner of Wales the trend has been firmly reversed and the lessons learned are advancing national red squirrel conservation strategies.

Red squirrels were historically a common sight in North Wales, and on the 720 km^2 island of Anglesey they were a particular feature of broadleaved woodland, parks and gardens. However, following grey squirrel colonisation of the island in the mid 1960s, the pattern of progressive red squirrel decline observed followed that recorded elsewhere. Populations were first lost from hardwood stands and then from coniferous habitats.

By 1997 only one small remnant red squirrel population remained. It consisted of no more than

Red squirrel northeastwildlife.co.uk

40 adults, all found within the isolated Sitka spruce, *Picea sitchensis*, and pine, *Pinus* spp., stands of the Mynydd Llwydiarth plantation. Grey squirrels have less of a competitive advantage over the red squirrel in such coniferous habitats, as greys do not favour the small seeds produced by conifer trees. But even here the red squirrel would ultimately be lost without direct management intervention.

Recognising that the island nature of Anglesey offered a unique opportunity to reverse the fortune of the red squirrel, The Esmé Kirby Snowdonia Trust organised a localised grey squirrel control program in 1998-1999. This led to development of a more comprehensive eradication strategy.

The initial focus was the removal of grey squirrels from the 240 hectare (ha) Mynydd Llwydiarth woodland. This operation resulted in a steady increase in both the number and distribution of red squirrels within the forest, and limited dispersal into adjacent broadleaved woodland. However, it was suspected that the highly fragmented nature of the islands woodland would reduce the ability of the red squirrel to re-colonise further afield. In 2003 a reintroduction project was started within the 700 ha Corsican pine, *Pinus nigra*, forest at Newborough in the south west of the island.

Captive red squirrels from a range of zoological collections were carefully selected to maximise the genetic diversity of the reintroduced stock. Between the years 2004 and 2007 animals were released into the forest, having been housed on site for several months in specially constructed enclosures. This scheme ultimately established a large wild population.

Although successful, the reintroduction was not without challenges; the most notable being disease associated with a newly discovered adenovirus infection. Both red and grey squirrels appear to

carry this virus as a 'subclinical infection' where no harmful effects are evident, but in other circumstances the virus can produce significant localised mortality in native squirrels – especially among captive collections.

The threat of adenovirus led to significant changes in reintroduction protocols. Animals were housed for short periods prior to their release, and only half a dozen animals were used at each site to reduce the chances of bringing in infection. These subsequent reintroductions focused on broadleaved stands dominated by oak, *Quercus* spp., ash, *Fraxinus excelsior,* beech, *Fagus sylvatica*, and sycamore, *Acer pseudoplatanus*.

During 2005-2011 red squirrels were released at seven locations on the island. The wild populations quickly established and soon colonised parks and gardens. Today Anglesey contains 400-500 red squirrels, making it the largest population in Wales, and the only one where individuals are found across the wide spectrum of coniferous and mixed deciduous woodland habitats. Although the grey squirrel has still not been eradicated from the island, it is estimated that fewer than 20 now remain. Trapping is funded through until the end of 2014 and it is anticipated these last few will be caught.

The re-establishment of the red squirrel delivered a range of associated socio-economic benefits; the latter through green and niche tourism sectors. The absence of greys is also beneficial for reasons beyond red squirrel conservation. Grey squirrels bark strip many tree species with oak, beech and hornbeam, *Carpinus betulus*, particularly vulnerable. Hence grey squirrel presence is a prohibitive factor to commercial hardwood production. In addition, recent research by the Game & Wildlife Conservation Trust has revealed lower fledging rates per pair of woodland songbirds with increasing populations of grey squirrels.

Anglesey demonstrated that systematic, landscape scale grey squirrel control can be effective. The red squirrel is now a common feature and an evolving parallel element in their conservation is to encourage sympathetic woodland management practices. Due to the predominantly arboreal nature of the red squirrel, in future it would be ideal to link up important woodland habitats. But for now the focus is on encouraging as many people as possible to plant, wherever they are based.

In North Wales, landowners often plant a 'native' broadleaved woodland mix, which commands a significant grant premium. Unfortunately, in the context of the red squirrel, the tree species mixtures encompassed offer a relatively poor food source, with a predominance of pioneer species such as alder, *Alnus glutinosa*, and willow, *Salix* spp., which produce very small seeds. Sessile oak, *Quercus petraea*, and hazel, *Corylus avellana*, are also included in the native list. But other good sources of seed such as beech, sweet chestnut, *Castanea sativa*, and Scots pine, *Pinus sylvestris,* are all excluded.

Addressing the lack of flexibility in generic 'native' management prescriptions and grant schemes is a current focus for Anglesey's conservation project, and a welcomed development is the red squirrel is now a feature of the Glastir agri-environment scheme. The presence of red squirrels has already led several landowners to establish new woods. For example, in 2012 an additional 5 ha of pine and mixed deciduous stands will be established. It is anticipated additional habitat creation will be a pattern in future years, benefitting local communities as well as an abundance of different woodland wildlife species.

Scottish wildcat's last hope

The Scottish wildcat, *Felis silvestris*, is our largest remaining native predator and can weigh up to 8kg. In Europe it is listed in Appendix II of the Bern Convention and Annexe IV of the EC Habitats Directive. In the UK it is listed in Schedule 5 of the Wildlife and Countryside Act 1981.

Scottish wildcats are descended from the European wildcat, which evolved effective camouflage, night vision and hearing to hunt in the densest forests. When the last ice age glaciations melted and sea levels rose, the wildcats trapped in Britain took on their own special traits, such as thick coats and tails in response to the colder weather, and a different coat pattern to better blend in with British forests.

These muscular wildcats are crepuscular carnivores, feeding on a wide variety of species including rodents, birds and insects, and sometimes bigger prey such as hares and young deer. Their preferred habitat is undisturbed broadleaved or mixed forest. However habitat loss has forced them, unusually for a feline, to use multiple habitats such as moorland, grassland and agricultural fringes.

The Romans hunted the British lynx to extinction and also persecuted the wildcats. During the agricultural and industrial revolutions vast areas of forest were destroyed in Britain. But Scotland's remote Highlands provided a haven for many examples of British wildlife, and this is why the wildcat survives in Scotland but is absent from the rest of Britain. Today the Scottish wildcat is not found below the industrial line of Edinburgh and Glasgow.

While official estimates number the remaining Scottish wildcats at less than 400, experts believe the figure is unlikely to be this high, and fear there may actually be fewer than 100. If this is the case, it

Scottish wildcat Neville Buck

may only be a few years before they are forced into extinction.

Their greatest threat is hybridisation with domestic cats, but feral rather than pet ones. This cross breeding is diluting the gene pool and severely reducing the percentage of pure wildcats in Scotland. Calculations put the population of feral domestic cats at around 100,000 in the Scottish Highlands.

The Scottish Wildcat Association is encouraging landowners, farmers and the public in the highlands to neuter their domestic cats, both pet and feral. This benefits both species, as the domestic cat is not adapted to survive in the harsh environment of the Scottish Highlands. In winter especially, the suffering and mortality rates are high, whereas the Scottish wildcat is well adapted to the harshest of Scotland's weather.

Other threats are much more minor than hybridisation, these include: road traffic incidents – people are advised to take care when driving in the highlands, for the sake of all wildlife; persecution – but this is far less prevalent than in Victorian times; disease – as with domestic cats the wildcat can suffer from cat flu and feline immunodeficiency virus, people are advised to get their pets inoculated to help prevent the spread, however there is evidence that wildcats are more resistant to the effects of these diseases; and habitat loss/fragmentation.

Evidence indicates that the best Scottish wildcat population, and therefore chance for conservation, is in the West Highlands. A new project is being established by the Scottish Wildcat Association, in conjunction with a range of other organisations and experts. The Wildcat Haven Project will be based in Ardnamurchan, near Fort William. It is a peninsula connected to the mainland by just a small strip of land, so is very close to an island ecosystem.

The project begins in winter 2012. A large number of live cat traps will be laid around the Ardnamurchan peninsula. The trapped cats will be assessed for wildcat pureness by means of an innovative new DNA technology. A team from Chester University will take blood samples and perform a genetic test. This takes two hours to strip the genome apart, and code and compare around 70,000 different genetic markers. The level of accuracy is very high and will tell the team what proportion of the cat is wildcat and what proportion is other.

Out of the total number of cats caught, if a suitably large percentage are pure wildcats then the remaining feral/hybrids will be neutered to allow just the wildcats to reproduce. However, if too few are true wildcats then some of the high percentage wildcat hybrids will be kept fertile. Over time it is hoped that the pure wildcat will breed back into the population.

A peninsula is a perfect location for the project, as the small land bridge can be easily policed to prevent the influx of further hybrids/feral cats. If this is successful the project will be expanded to other prime areas, such as the Mull of Kintyre peninsula in Argyll. This technique has generated great interest in Europe, as their European wildcats, *Felis silvestris silvestris*, are facing the same problems.

Native forestry Steve Piper

There is a population of captive bred Scottish wildcats. However, this was accumulated before hybridisation was understood. Therefore there is a good chance that many, if not all, will now be hybrids. Again the gene test will enable conservationists to assess pureness. A last resort would be to take wildcats from the Scottish highlands into a captive breeding programme. It is hoped that after just a couple of generations they would be able to restock the wild population.

If the worst case scenario plays out and no pure wildcats are found, a technique called 'back breeding' would be employed. This has been used in other species, such as horses. It involves breeding hybrids together to obtain a high percentage of wildcat genes, and eventually, hopefully, breed pure wildcats out of the gene pool.

The north of Scotland also holds promise of finding pure wildcats, as there have been several sightings of very large cats. The Scottish Wildcat Association is keen to hear of any wildcat sightings. Due to the high numbers of hybrids, they are especially eager to receive photographic evidence to make a visual assessment. Please email sightings@scottishwildcats.co.uk

While Scotland has retained more of its natural heritage than other areas of Britain, there is still too little for species like the Scottish wildcat. Reforestation projects can help provide greater habitat opportunities for them. Landscape scale conservation and creation of woodland would increase prey density and their ability to survive. Forests are warmer in winter and are a natural collecting point for over-wintering species. But the creation of native woodland is vital as plantations offer little to support prey species.

Road devlelopment WTPL-David Bell

Stag beetle female PTES Volunteer

Stag beetle conservation

Britain's largest terrestrial beetle is the stag beetle, *Lucanus cervus*; adult males can reach up to 70mm in length. Its English name relates to the great jaw-like mandibles of the male, which look remarkably like a stag's antlers. Due to a steep decline in their numbers, ascertained from sightings/records (totals are uncertain), they are a UK Biodiversity Action Plan (BAP) species and are included on Schedule II of the EC Habitats Directive.

In 1998 the People's Trust for Endangered Species (PTES) became the lead partner for the stag beetle BAP. These iconic beetles are also seen as a flagship species for other saproxylic invertebrates and veteran/ancient trees. The PTES' three national stag beetle surveys in 1998, 2002 and 2006-2007 recorded sightings of the beetle across the British Isles. But their main stronghold is in south-east England where temperatures are generally higher and rainfall is lower, particularly in regions with well-drained soil.

Stag beetles show a predilection for damp, decaying timber found underground up to a depth of 50cm in open-grown situations – such as wood pasture, parkland, gardens and veteran/ancient trees. Broadleaved trees are their preferred deadwood source, but not exclusively. As identified from the spread of records sent in during the national surveys, soil type is another important factor; they favour warm alluvial soils whereas those over chalk are not desirable. The larvae live underground and move between rotting tree roots and the surrounding soil, avoiding chalky or clay soils that may easily become waterlogged.

The lifecycle of the stag beetle is surprisingly long. Female beetles bury into light soils and lay their eggs next to decaying timber. Once hatched, they can spend between three and seven years in their larval stage eating deadwood. The larvae carve out galleries in the wood or are found in the soil eating the wood from the outside.

Stag beetle male PTES Volunteer

Once they are ready to mature into adult beetles, they create a hollow, pupal cell in the soil in which to transform. The resulting beetles emerge from their pupae in late summer, but spend the winter underground in their pupal cells. In late spring/early summer of the next year they dig their way to the surface.[i]

The loss of vital deadwood habitat is one of the major issues facing the survival of the stag beetle. Another problem is their relatively poor dispersal skills. While the adult male beetles may be able to fly up to 500m from where they emerge, the females rarely travel further than 20m. They therefore require regular supplies of deadwood throughout the landscape to ensure their survival.

Following much dedicated research into stag beetle life cycles and needs, PTES offers advice and guidance on how to benefit this nationally scarce invertebrate:

- Leave tree stumps and fallen trees to provide a plentiful supply of rotting timber
- Replenish fallen deadwood where stag beetles are known to exist.
- Create a log pyramid so they can more easily colonise new areas, preferably close to an existing colony to create stepping stones for the beetles.

How to create a log pyramid:

- Use wood from broadleaf trees, especially oak, beech or fruit trees.
- Use fresh logs with the bark attached, to provide longer lasting habitat.
- Logs should be at least the thickness of an adult's arm.
- Site logs in partial shade, to prevent them drying out.
- Partially bury the logs vertically in the soil – this retains moisture, increases the number of visiting insects and ensures a good food supply for the larvae.
- Create a pyramid shape by positioning the end ones vertically at a lower level, gradually heightening to a peak in the middle (see photo).
- Avoid making the log pile too high, or the wood will dry out.
- Allow plants to grow over the logs, retaining moisture and providing shade.[ii]

Stag beetle larva Becky Hales

PTES also collate records of stag beetles, to log a sighting follow this link: http://www.ptes.org/moremammals/greatstaghunt/stag_beetle.php.

The growing desire for woodfuel and increased woodland management are potential threats to the quantity of available deadwood. Care must be taken to ensure a good supply of deadwood remains in woods, parks and gardens; to benefit stag beetles and the vast range of other saproxylic life that depends on it for survival.

[i] PTES (2011) *Great Stag Hunt III: National stag beetle survey 2006-2007*. Available online: http://www.ptes.org/files/1446_gsh_final_report.pdf

[ii] PTES (2010) *Stepping Stones for Stags*. Available online: http://www.ptes.org/files/1871_stepping_stones_final_lowres.pdf

Stag beetle log pyramid Stephen Heywood

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