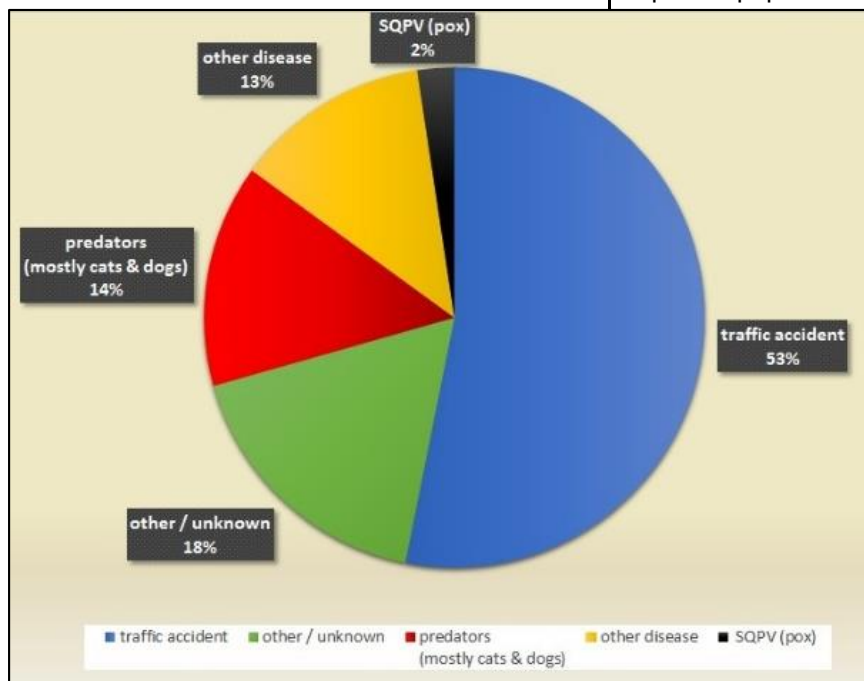


Analysis of scientific research about the main causes of unnatural deaths in red squirrel population in the UK

Detailed studies conducted in the last 20 years (Shuttleworth 2001, Dutton 2004, LaRose et al. 2010, Simpson et al. 2013) let very precisely determine the main statistical causes of "unnatural deaths in red squirrel population in the UK". Below we present graphically the most frequently listed in the above studies reasons of unnatural deaths in red squirrel population in the UK.

Statistically the second reason which can account for even 36% of unnatural deaths in red squirrel population in the UK (Dutton 2004) is attack by another animal (most frequently unguarded – and/or not equipped in devices audibly signalling their presence – household pets). This cause of unnatural deaths in red squirrel population in the UK mainly occurs



habitats near "moderately urbanised" areas (most often near small towns or villages). In the areas least urbanised (nature reserves and surroundings) the problem can affect even 12% (Shuttleworth 2001) of population (in that last case – reserves – very often it is not clear if the death was caused by a household pet or by a wild animal). The most recent data collected from areas of varied level of urbanisation show that pets cause over 9% (9.2%) of unnatural deaths of red squirrels in the UK (Simpson et al. 2013).

Figure 1. Causes of red squirrels mortality: from the collection of research data from the last 20 years by Shuttleworth 2001, Dutton 2004, LaRose et al. 2010, Simpson et al. 2013.

Discussion on the research results

Regardless whether the studies were conducted in big woodland areas with "low level of urbanisation" (Shuttleworth 2001) or they included areas "more urbanised" (Dutton 2004, Simpson et al. 2013) the main cause **(even up to 94%) of unnatural deaths in red squirrel population in the UK was human activity.**

All above listed papers as the main cause of unnatural deaths in red squirrel population in the UK list road traffic accidents. In "suburban areas and gardens" **unnatural deaths resulting from road accidents reach even 88% of examined cases** (Shuttleworth 2001). Surprisingly high (36%-83,6%) mortality due to this reason is also noted in the areas where "level of urbanisation" definitely is not one of the highest in the UK (Dutton 2004). The most recent data collected from areas of varied level of urbanisation show that road traffic accidents are the reason of over 41% (41.7%) of unnatural deaths of red squirrels in the UK (Simpson et al. 2013).

Incorrect forestry policies as one of the main causes of unnatural deaths and population decline of red squirrels in the UK

Even though red squirrels have been officially "protected species" for 40 years, in places where their protection collides with economic interests in practice they don't have any protection.

In the UK there are vast areas of forests felled in the areas of common occurrence of red squirrels even in breeding seasons which causes every year deaths of hundreds if not thousands of young red squirrels completely dependent on their mothers.

During forest clearing operations in the area with red squirrels present Forestry Commission don't even require leaving – at least for a few months – so called "woodland corridors" which give animals a chance to move to another place after habitat loss. Such forestry practices lead to significant decline of red squirrel population and very often to local extinction (Lurz et al. 1998). These unfavourable forestry practices – in use in the UK for many decades – are common in the UK today not only in profit-focused commercial woodlands.

ICSRS

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As scientific research shows, **red squirrels are very vulnerable to habitat fragmentation** (Gurnell & Pepper 1991, Rodriguez & Andren 1999, Huxley 2003, Verbelyen et al. 2003, Flaherty et al. 2012). **They are also definitely less "mobile" than grey squirrels who in adverse conditions can travel even several miles looking for a suitable habitat – such practices of tree felling in fact accelerate the spread of grey squirrels into new areas.**

Scientists and environmentalists agree that loss of habitat availability and quality is one of the main reasons of the significant red squirrel population decline in the UK (Verboom & Apeldoorn 1990, Kenward & Holm 1993, Bryce et al. 2002, Huxley 2003, Lurz et al. 2003, Harris et al. 2006, Bryant 2011, Flaherty et al. 2012).

New threats

Incorrect supplementary feeding of red squirrels can promote local outbreaks of squirrel poxvirus (SQPV)

The risk of the disease transmission via shared feeders was pointed out by scientists already but all possible ways of disease transmission were not known at the time (Huxley 2003, Duff 2012) and that theory so far didn't have a definite support in scientific research.

Recently information from scientific research about **places and dates of local squirrel pox (SQPV) outbreaks in 2005 – 2012 in the UK** (White & Lurz 2014) was compared with information about the introduction of supplementary feeding of red squirrels in those areas using shared feeders (ICSRS 2015f). It turns out that in most of the places where SQPV was never noted before the outbreak was preceded by the introduction of intensive supplementary feeding of red squirrels in a given area using shared feeders (ICSRS 2015f).

In one of the biggest areas in the UK where for the last 15 years there has been work done with the goal of "red squirrel conservation", **before the start of the program (2000) pox virus didn't occur at all. After 12 years of "conservation work", done among other actions by using shared feeders, that area became a place where pox occurs most frequently in the red squirrel population in the UK** causing locally serious losses (ICSRS 2015f).

Similar correlation between the introduction of supplementary feeding of red squirrels using shared feeders and the occurrence of pox outbreak was observed in many other areas in the UK and Republic of Ireland (ICSRS 2015f).

Scientific research published in 2012 as one of results determined that **red squirrel infected with pox is many times more dangerous to other squirrels than a grey squirrel with the same infection** (Warnock et al. 2012, Collins et al. 2014). The threat is caused not only by the fact that **pox infected red squirrels** have even 2500 times more virus level in the blood but mainly because they are able – unlike grey squirrels – to **transmit pox virus via droplet infection (saliva)** (Warnock et al. 2012, Collins et al. 2014)

As it's commonly known, **"droplet infection" is one of the most frequent way of disease transmission.** The risk of transferring a disease via droplet infection is increased significantly when infected individuals – like European red squirrels with pox infection – are in contact with each other in large numbers in a small area – like for example "shared feeding station".

There is a strong positive correlation between the start of supplementary feeding of red squirrels using shared feeders and the occurrence within a short period of time of pox outbreak in the population fed this way. The magnitude of the problem is even greater because there were cases of continuing feeding red squirrels using shared feeders during the outbreak (ICSRS 2015f)

Considering the fact that "shared feeders" are visited in one day usually by some to tens of red squirrels (and that often the same squirrel uses in one day a few different shared feeders in the area), **chemical cleaning of feeders "even once a day" only to a very limited extent may decrease the risk of transmitting the virus in this way. That's why in the areas where European red squirrels live in the UK the way of feeding them should be changed to "scatter feeding"** (In short, it's about placing several nuts near trees – as many as the squirrel has a chance to quickly eat and/or bury) **to significantly reduce the possibility of "exchanging body fluids" in a small area by many red squirrel within one day.**

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Current state of conservation works

aimed at minimising the main reasons of unnatural deaths in the population of red squirrels in the UK

Most of the above mentioned main reasons of unnatural deaths in the red squirrel population caused by man can be

for the most part eliminated – or significantly minimised – using effective and relatively cheap solutions known in the world and in the UK for years. **Unfortunately in the UK for several years practically nothing has been done in this matter** because "there is constantly not enough funds for such projects". This most frequent "answer" we hear is especially surprising when we consider the fact that **construction of a few hundred of air bridges** (in the areas of high mortality in red squirrel population) or **running an information campaign among pet owners** (e.g. about the necessity for pets which are let out into the garden to wear bells or other devices "signalling their presence") **would not only be a "once-off cost" but would also require spending many times less public funds compared to the millions of pounds spent every year by the same institutions on killing grey squirrels**. When it comes to a "legal protection of red squirrels habitats" in the UK in practice we're also dealing with "cosmetic actions" rather than actually helping, example of that is



massive and common felling of woodland in the areas of red squirrels occurrence without "legal requirement" to provide them with – at least for a few months – "woodland corridors" that would give red squirrel population a chance to translocate from the

area where man destroys their natural habitat. Apart from that, considering that in the UK forests are extensively felled in the areas of common occurrence of red squirrels even in breeding season, we can expect that every year hundreds if not thousands of young squirrels are killed (or rather starved to death). So far institutions legally bound to protect red squirrels didn't even conduct basic research to answer the question "how the woodland policy affects the level of unnatural deaths in the population of red squirrels on the UK.

References and more about squirrels: www.i-csrs.com/red-squirrels-mortality

Visit the Facebook page and sign the petition to stop grey squirrel cull: www.facebook.com/StopSquirrelCull

Photo credit: Steve Tipton